Personal Computer World

NEW Net Workshop p210

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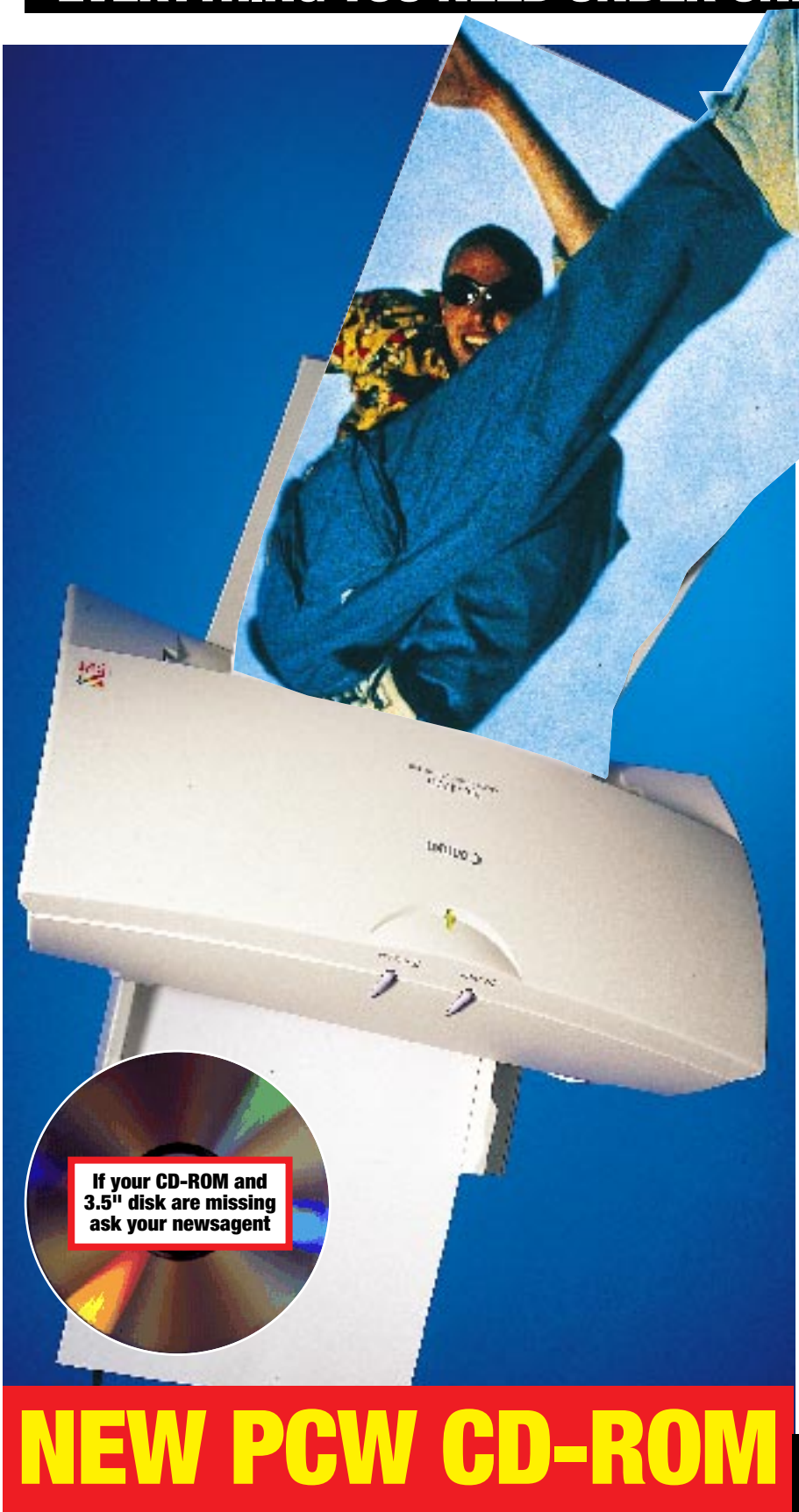

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Reviewed: Matrox Mystique, Mesh Elite P133, Iomega Ditto, 10x Pioneer CD Drive

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NEW PCW CD-ROM

Cutting Edge: Netscape Bites Back

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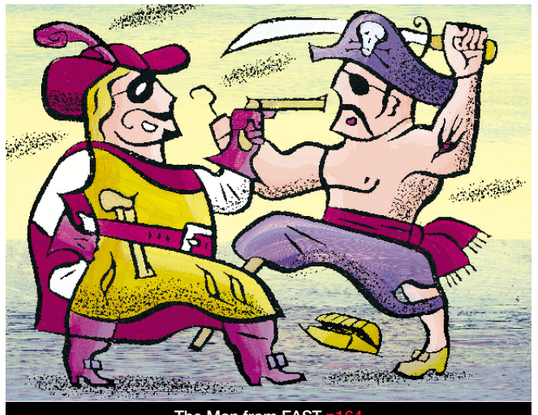

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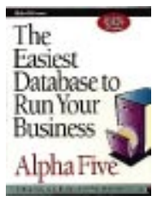

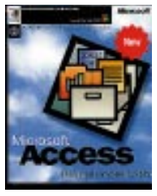

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Direct Buyers' World

The place in PCW where you can compare prices on a wide range of hardware and software. The card insert at page 349 marks the start of the section.

Our Product Locator, on page 522, lists advertisers by product category, making it easier to find what you're looking for.

Personal Computer World

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Editorial

Fancy a full-blown version of Windows 95 on a PDA? How about a Java-powered computer not much bigger than a packet of cigarettes? That's just what you will be getting in 1997 thanks to Microsoft, Corel and at least four hardware vendors. With all the hype surrounding Network Computers right now, it is easy to overlook the power of those innocent little PDAs we've had in the form of Psion 3a's and H-P LX 200s over the past few years.

Until now, there has been little in the way of real integration with desktop OSs and the world of the PDA. Sure, you can transfer files from one to the other, but the ways of working have been different. How much would you pay for a PDA that looks and feels just like Windows 95? And one that you can connect to the internet?

Next year's arrival of Windows CE (Compact Edition; *see Newsprint, page 24*) is eagerly awaited here and in the US. After all, what is a modem-equipped/Windows 95-equipped/IR-equipped PDA if not a mini Network Computer complete with built-in keyboard? In the US, these devices should sell for about $350 on the street. My guess is that they will walk off the shelves once the third-party vendors (Hewlett-Packard included) ramp-up production. Thousands of Windows 95 users will find it hard to resist such devices and give Psion something to think hard about. For Microsoft it means a way in which to defend itself from the threat of Java-based devices, one of which is being feverishly developed by Corel (*see Newsprint, page 27*). Corel! If that doesn't prove we are living in exciting times, nothing does. This sounds a genuinely cool prospect. Users will be able to view the web in colour or mono, run on a RISC processor and download Java applets. Let's hope Corel can pull it out of the bag.

Java or WindowsCE: whichever route buyers choose, the real significance is the genuine downsizing of computing these devices represent. It is not hard to see mid-sized units being developed (with keyboards big enough to type on for long periods) and snapped up by business people unwilling to fork out for flabby notebooks. It looks like 1997 could bring the NCs we need.

PJ Fisher

Managing Editor

Next Month

Christmas is coming! It's time to stock up on the mince pies, mulled wine, and major upgrades from Microsoft and Lotus.

Office 97

Microsoft takes its market-leading suite one stage further. We look at what's new and what's better.

Lotus SmartSuite

And in the blue corner… the 97 model from Lotus. We bring you a full test.

Group Tests

Modems

The UK's definitive guide to online hardware.

Multimedia PCs

Best-value multimedia PCs, tested and rated.

Plus…

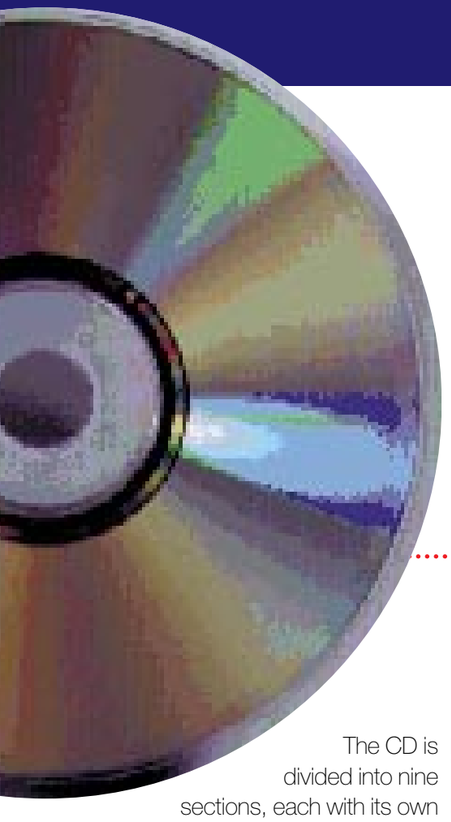
Silicon Graphics breaks the price barrier.

Our exclusive look at SG's sensational new work-station.

December 96 issue
■ On sale Thursday 7th November

January 97 issue
■ On sale Thursday 5th December

** Next month's contents subject to change.*



Personal Computer World

November Cover disc

Welcome to issue 3 of our new-look *PCW* CD-ROM cover disc. We have over 600Mb of games, multimedia and resources for you to explore and enjoy, complete with a help file on the root of the CD.

The CD is divided into nine sections, each with its own icon. Each section is almost always visible on-screen so you can move from section to section by clicking on the appropriate line instead of having to return to a homepage. If you aren't sure which section is where, roll over the buttons and the name of that section will be displayed, along with its contents list. Exit the disc by clicking on the "Q" at the bottom left of the screen.

Music in the form of MIDI files, a video from the Image Bank collection and 24-bit colour images. To get the most out of the 12 classical MIDI compositions you will need a wavetable sound card correctly configured for Windows (most good sound cards today support wavetable sound). Ordinary cards will work, but the instruments won't sound terribly realistic.

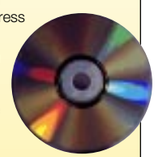
The Images section includes 32 graphic images

How to use the CD-ROM

1. Quit existing applications.

2. Put the disc into your CD-ROM drive.

3. Win 95: If you've got Windows 95, the *PCW* Interactive loader will appear on your screen. If your CD doesn't auto-load, start Windows Explorer and double-click PCW.exe.
Win 3.1: From Windows Program Manager choose File/Run, then type in <CD Drive>:\PCW.exe and press enter.



4. Click on main menu. If you don't have Quicktime for Windows and Video for Windows installed you will be offered the chance to install them before continuing.

Hardware requirements

To run the CD-ROM, you need a PC with Windows 3.1 or later and a colour VGA display. We recommend a multimedia 486 or Pentium PC with a minimum 8Mb of RAM. The optimum configuration is a 16Mb Pentium.

Possible CD-ROM problems

1. Initially, if you have a problem going to any of the nine sections from the introduction screen, restart your PC and, after shutting down any unnecessary applications, click on the Main menu button from the loader. Wait for the animation to stop, WITHOUT pressing either the escape key or the "P" key, and then click on your chosen section button.

2. If you have launched Acrobat reader in the Hands On section and cannot find the search icon that is described in the first page of notes, this may be because you already have a copy of Acrobat reader on your C: drive, so the autostart for this cover disc is not asking you to install our version which includes the search facilities. You can either delete your Acrobat reader from the C: drive, or change its name and run PCW.EXE again, which this time should ask you to install the Acrobat reader with search facilities.

3. If you get a message such as "Not ready reading drive D:" you may have a dud CD. Return the disc to: TIB House, 11 Edward Street, Bradford DB4 7BH, for a free replacement.

■ For other problems concerning the CD, call 0891 715929. Calls cost 39p/minute off-peak and 49p at all other times.

Focus on

A *PCW* video interview with Dylan Armbrust about colour inkjet printers.

Games

Test, among others, the action-strategy game, Syndicate Wars

Preview the three games on this month's CD. You can play some games straight away, while others may need to be installed first or can only be played from DOS.

Getting Started

A beginner's interactive guide to notebooks and PCs.

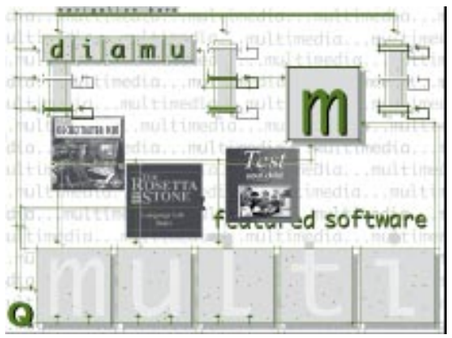
Hands on

Install and launch the Acrobat reader to view and search *PCW Hands On* articles from the past year.

All the regulars are here in a year's Hands On

Multimedia

The Multimedia and Featured Software section contains the latest interactive Windows demos.



Digital Orchestra Plus joins Rosetta Stone and Test Your Child in the Multimedia section

Resources

A library of shareware, utilities and drivers, each with a brief description which can be copied onto your hard disk, using Netscape.

Floppy disk

Armchair racers can spit gravel and burn rubber with our driving game this month.

■ **World Rally Fever**

A great game which captures all the fun and playability of the best arcade race games. It combines fast graphics with furious driving action.

To install World Rally Fever from the floppy disk: from File Manager or Windows 95 Explorer, double-click on PCWRALLY.EXE and follow the instructions. To install World Rally Fever from the CD, go to the "floppy" directory and click on PCWRALLY.EXE.

Possible problems with the floppy

■ If you have problems with the floppy, such as a message "cannot read from drive a:" please return the disk to TIB PLC, TIB House, 11 Edward Street, Bradford BD4 7BH, together with an SAE and two 25p stamps. Where it is a duplication fault, the postage will be returned with your replacement disk. TIB is on 01274 736990.

■ Our floppy disk hotline is available on weekdays from 10.30am - 4.30pm on 0891 715929.

■ *PCW* cover disks are thoroughly virus checked, but *PCW* cannot accept liability for problems arising from use of the disk.

You are advised not to install any software on a networked PC without first checking it.

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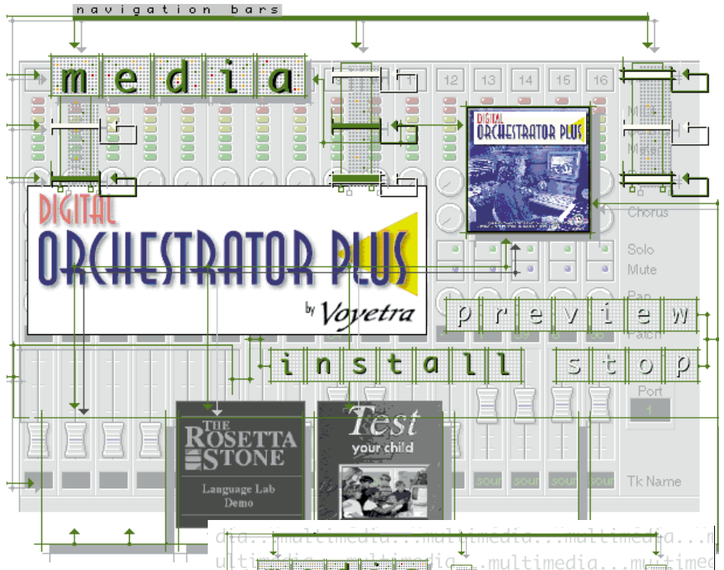
PCW reviews index, advertisers' index, glossary, and information about the CD.

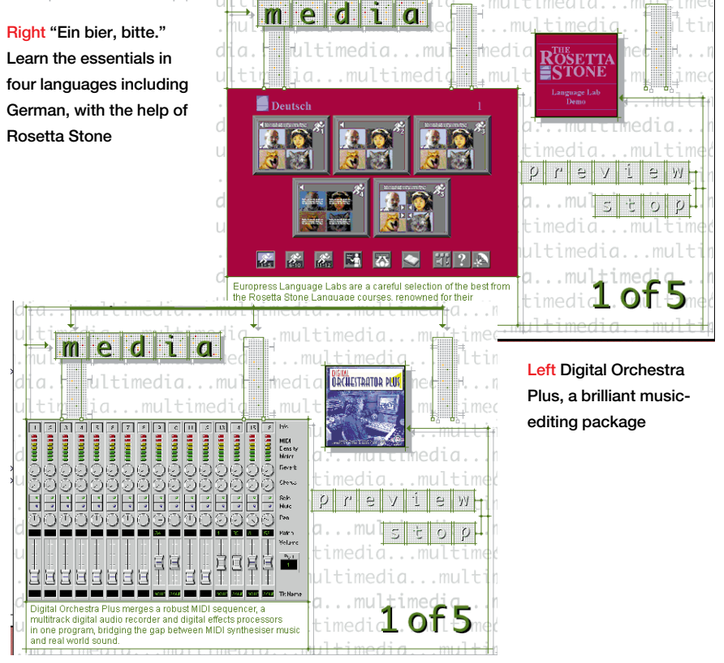
A database of what's been in *PCW* over the last 15 months

Browse through VNU's web e-zine. Play with the interactive radio. View an episode of the "Stoney Blokes", then watch out for our competition for a chance to win a copy of Macromedia Director 5.0.

Browse through VNU's new e-zine even if you're not on the web



Right "Ein bier, bitte." Learn the essentials in four languages including German, with the help of Rosetta Stone



Left Digital Orchestra Plus, a brilliant music-editing package

Multimedia & Featured Software

To preview any of the multimedia demonstrations, drag one of the images along the bottom, into the box in the top right corner.

Digital Orchestrator Plus — a musical editing package.
Rosetta Stone Language Lab — demo.
Test Your Child — a package which enables you to monitor the educational progress of your child.

Please note: the demos featured in the Games and Multimedia sections can be previewed and some will run from the *PCW* main interface. However, due to technical issues concerning the software supplied to us, some demos will not run alongside the interface and others require installation to your hard disk.

■ Fast Track

If you would prefer to play or install the Games and Multimedia demos from outside the main *PCW* interface, or want to know the location of the Resources homepage (in order to use your own internet browser rather than the default Netscape browser), click on the HELP button on the *PCW* loader. This help/info file also contains the locations of other items on the disk, along with a full contents list and help tips.

Games

To preview any of the games, drag one of the images along the bottom, into the box in the top right corner.

Bad Mojo

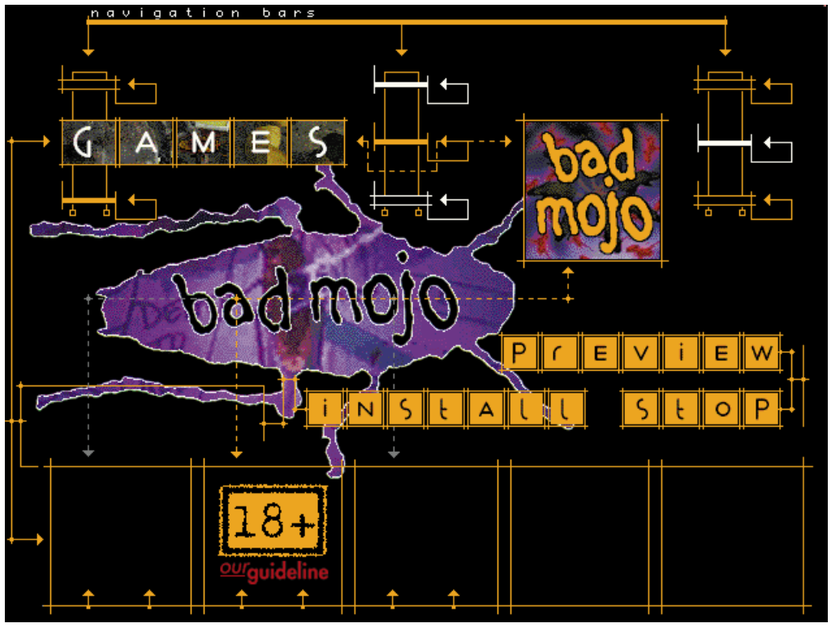
In this game, you are Dr Roger Samms who has been transformed into a hideous cockroach. While exploring your new surroundings, attempting to uncover the mystery surrounding your predicament, you have to overcome many obstacles to venture from room to room.

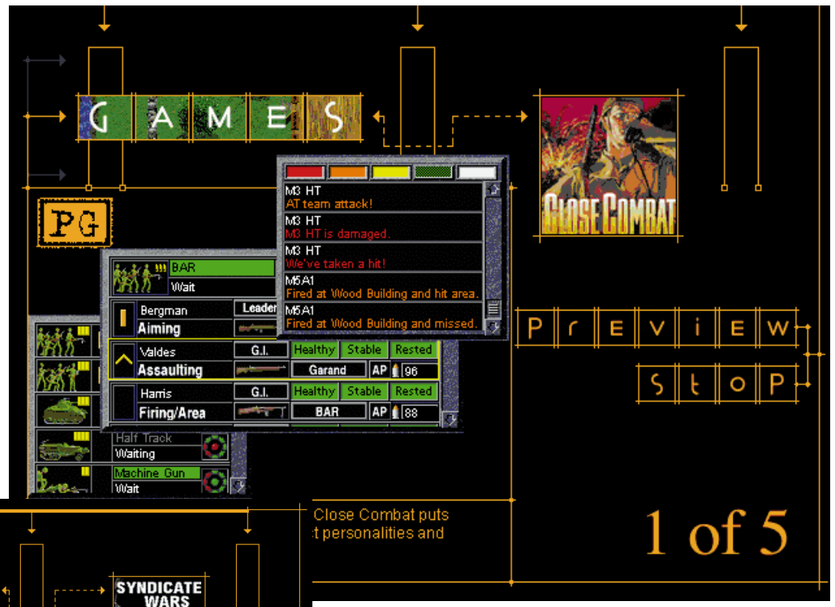
Close Combat

Developed by Atomic Games, Close Combat is a war strategy game that creates battlefield realism. It focuses on the human element of war and puts the players in control of soldiers with individual profiles. (Sorry, Windows 3.11 users, this is Windows 95 only.)

Syndicate Wars

This is the eagerly-awaited sequel to the classic Syndicate. In an exciting blend of strategy and explosive action, you control the lead agent on complicated and exciting missions.





Top Our CD gives the age recommendation for each game, including Bad Mojo which is strictly for the older ones
Above Plan your strategy well in Close Combat. Remember, there are lives at stake!
Left Boys and their toys. The other war game this month is Syndicate Wars

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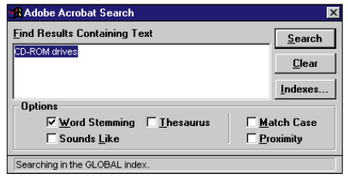
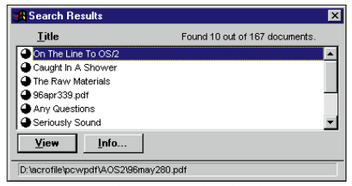
Using the Hands On section

Load Acrobat either by selecting Hands On from the launch menu or by going into the Hands On section of the main menu.

To search Acrobat files, just click on the



Just type in the word you want to search for — in our case, CD-ROMs



In a second or two, a list of all the files containing that word will appear

icon. A dialogue will appear. Just type in the word you want to search for and click the search icon. In a second or so, the search results dialogue will appear containing a list of the files containing that word.

You can then view any of the files. The word you search for (CD-ROM drives in our example) is highlighted. On average-sized monitors the text will be greeked, but you can use the magnifying glass icon to expand the text. Just click on the icon and, using your mouse, select the area of the page you want to magnify.

The default index for the Acrobat files is a global search of all files. You should find the global search quite fast enough. If you're looking for a very common word however, such as "Windows", you may want to narrow your search. To do this, click on the indexes button in the search dialogue and click add to add any additional indexes which have the prefix PDX and are located in

<CD Drive>\ACROFILE\PCWPDF\

Using the Resources section

The files in this section are copied to your hard disk using the default Netscape browser on the CD.

If you already have your own frames-compatible browser installed and want to access the Resources section, run your browser, go to File Open and open

D:\html\res\resource.htm

■ Compressed Zip files or self-extracting archives

Most files in this section are compressed Zip files or self-extracting archives. Click on the file you would like to copy to your hard disk. A box appears stating the name of the file to copy and the destination directory. Click on OK. If you are using the default browser, you will be given the option of:

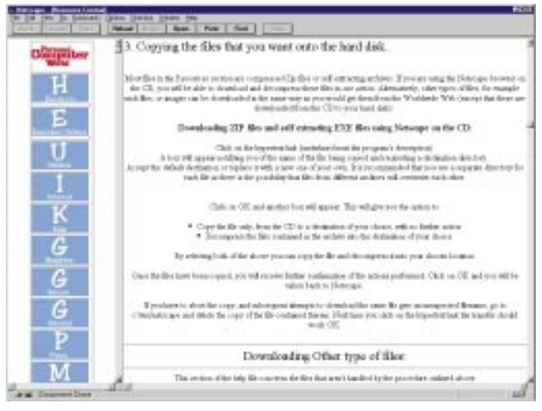
1. Copying the file only, from the CD to a destination of your choice, with no further action; or
2. Decompressing the files contained in the archive into the destination of your choice.

By selecting both options you can copy the file *and* decompress it into your chosen location.

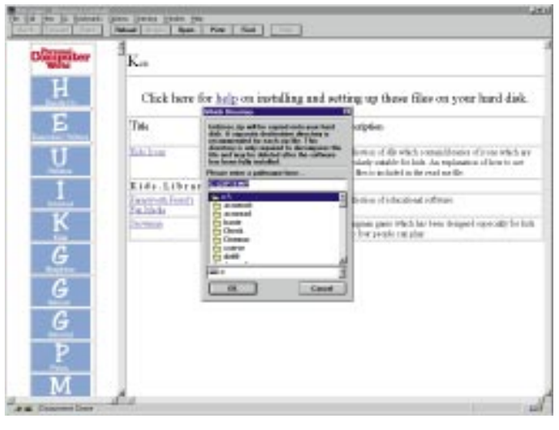
If you have to abort the copy, and subsequent attempts to download the same file give an unexpected file name, go to

c:\vnu\netscape

and delete the copy of the file contained therein. Next time you click on the hypertext link, the transfer should work OK.



Click the Help button in the Resources section



Just click on the file you want to download

■ Other file types

Click on the file that you would like to copy to your hard disk. This will bring up the "save as" dialogue box. Choose where you want to copy the file (make sure you don't try to copy the file to the CD itself or you will get an error message). It's a good idea to create a directory or folder for it first (using Windows File Manager or Explorer).

Note: Avoid copying any of the resources files into your Windows directory or into the root of your C: drive.

Using Netscape

The *Personal Computer World* Interactive CD-ROM uses Netscape as the delivery mechanism for the Resources section and to run the Room e-zine.

If you're on the internet, chances are you're already using Netscape and have a rough idea how it works. If you're not, this provides a great opportunity to find out what this browser business is all about.

You navigate through web (or HTML) pages using hyperlinks. These are images, or more often highlighted text, which take you backwards or forwards through various pages. You can also move back and forth through pages you've already visited, by using the backward and forward arrows on the toolbar.

Netscape 2.0 also has a feature called "frames". This divides the screen into separate areas. When using frames, the right-hand mouse button is used to move backwards and forwards, rather than the arrow keys.

When using Netscape from within *PCW* Interactive, you'll need to go to File/Exit to return to the main screen.

Installing PKUnzip or Winzip

Zip files are the standard compression format for distributing programs and utilities on the web and on floppy disk.

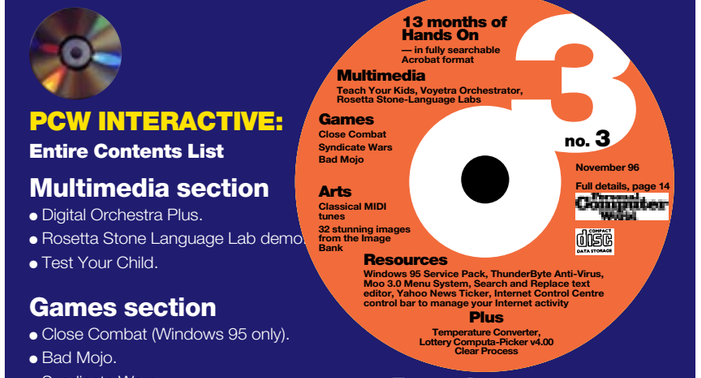
If you choose to copy the resources zip files on to your hard disk, and decompress them later, you will need to install PKUnzip or Winzip before you can "unzip" them. Go to the Essential Utilities section and click the link "PKZip/PKUnzip" or "Winzip"

■ Winzip: choose Winzip, and a new page will appear offering you Winzip for Win95 and Winzip for Windows 3.11. Select the appropriate platform and save it to a location of your choice. If you have less than 16Mb of RAM it's probably a good idea to quit Navigator and the *PCW* CD next. Then use File Manager or Explorer to find Winzip95.exe or wz60wn16.exe.

■ PKUnzip: choose PKUnzip and save pkz204g.exe onto your hard disk — the C:\DOS\ folder is as good a place as any to save it. After you've quit Navigator and the *PCW* CD, double-click on the file to expand it into 16 separate files (if you have chosen not to decompress and save it to your HD in one action).

■ Associating the file: unless you intend to use DOS to unzip files (laborious and tricky) you need to associate .zip files with PKUnzip. From File Manager choose File Associate to associate *.zip files with PKUNZIP.EXE. Under Windows 95, zip files will be associated automatically.

November 1996



PCW INTERACTIVE:

Entire Contents List

Multimedia section

- Digital Orchestra Plus.
- Rosetta Stone Language Lab demo.
- Test Your Child.

Games section

- Close Combat (Windows 95 only).
- Bad Mojo.
- Syndicate Wars.

Arts section

- 12 classical MIDI tracks from Liszt, Schubert, Weber, Albeniz, Faure, Grieg, Macdowell.
- 32 graphic images from the Image Bank.
- A video from the Image Bank collection.

Getting Started

- A beginner's interactive exploration of notebooks and desktop PCs.

Focus On

- A *PCW* interview about colour inkjet printers

Hands On

- Hints, tips and practical advice on every aspect of personal computing

F O L D H E R E

The Room

- A browse through VNU's new e-zine.
- A chance to win a copy of Macromedia Director 5.0.

Resources section

Some of the files referred to in the *Hands On* section.

- Avery Label Templates
- Backlash
- Bad Toys
- Chachchk
- Chess
- Clear Process
- CV Author
- Flaps
- FullMotion V.2
- Global Positioning System software
- Help Maker Plus
- Internet Control Centre
- Klick-N-View business cards
- Lottery Computa-Picka v4.0
- Meeja
- MicroAngelo v2.1
- MOO 4.0 menu system
- Morpher 2
- Paintshop Pro
- PKzip, PKUnzip
- Ponger
- Ponger 32
- Screen Thief 95
- Search and Replace
- Temperature Converter
- Thunder Byte Anti-Virus
- VBRUN 100, 200, 300, & 400
- Video for Windows
- Vinyl Goddess From Mars
- *What PC?* Mobile Pages for Series 3a
- Win95 Service Pack 1
- Wincode
- Winsock Swapper
- Winzip
- WS Archie
- WS-Timer
- Yahoo! News Ticker

Reference section

- 15-month products and features archivable database
- Advertisers' Index
- General information about the CD
- Glossary of computer terms

Wanted: material for *PCW* cover CD-ROMs

We are always on the lookout for material for our cover-mounted CD-ROMs. If you think you have something that might be suitable, such as software, pictures, fonts, demos and so on, please let us know. Email Steven Rogers at stevenr@vnu.co.uk or write to him at CD Development, New Media, VNU Business Publications Ltd, 32-34 Broadwick Street, London W1A 2HG.
Please note that Steve cannot deal with technical support.

Newsprint

Contents

New Windows mobiles put squeeze on Psion

From TIM BAJARIN in San José

MAJOR MANUFACTURERS are set to launch handhelds based on a Microsoft reference design – using a new Windows operating system.

The first devices built to the Handheld PC (HPC) specification, codenamed Pegasus, will début at next month's Comdex. They look similar to the HP-200LX palmtops only slightly larger, sources say.

They run Windows CE (for Compact Edition), a Win95 look-alike that is actually a completely new operating system crammed into 1Mb. Applications will have to be rewritten for it, but they can be file-compatible with their desktop equivalents. Significantly, Windows CE runs on non-Intel chips, breaking mobile design away from the x86 dynasty.

It can also be used to control devices such as set-top boxes, digital TVs and smart phones (which, with their capacity for email, could beat web devices to the mass market).

A version of Internet Explorer allows web access, challenging a new Netscape mobile browser initiative (see page 35).

Details of Windows CE leaked out as market-leading UK palmtop specialist Psion launched two new models, *writes Clive Akass*. Psion, which is trying to establish its own operating system as a mobile standard, is bound to feel the squeeze if rivals back CE.

But one of the many exciting aspects of mobiles is that they are not tied to the Intel/Windows dynasty.

Mobiles are one area where a rank outsider could yet sweep the board: one of the most interesting announcements has come from, of all people, Corel. And the pen-drive Palm Pilot (see *PCW* September) has been touted as a Psion rival.

● Corel and the new Psions, page 27; reviews, pages 64/66.

The Mitsumi FX-120 —one of the first 12-speed drives

First 12-speeds

■ Mitsumi and TEAC both launched fastest-yet 12-speed CD drives last month. Both are CLV (Constant Linear Velocity) devices, which means the transfer rate is a constant 18Mb/second across the disk.

Stuart Draper, of TEAC, warned that some alleged 12-speeds achieve their stated rate only at maximum.

Mitsumi's FX-120 drive is available now for £141; the TEAC costs £151 (incl. VAT). See next month for reviews.
Mitsumi 01276 29029;
TEAC 01923 819630

Newsprint welcomes feedback. Fax your news and views to 0171 316 9317, or email clivea@vnu.co.uk, or post to the *PCW* forum at www.pcw.vnu.co.uk

Cheap CD recorder 'to replace ROM drive'

MITSUMI WILL HAVE a CD recorder available "at consumer prices" by next month and in volume by early next year.

The device will cost less than current models but more than a CD drive. It will read CDs at six-speed and record at two-speed, and is designed to replace the standard CD drive in PCs.

Mitsumi has cut costs by using a standard ATAPI /EIDE interface rather than the more expensive SCSI.

Philips is bringing out a CD Erasable recorder (as opposed to write once, read many). But Mitsumi IT manager Thomas Hecker said: "Disks written on the Mitsumi can be read by any CD. The Philips disks need a modified drive. The modification only costs about a dollar, but existing drives don't have it."

● Mitsumi also announced Circle Sound, a £22 box which fits between your sound card and amp to create a 3D effect.
Mitsumi 01276 29029

A device with a fair chance of replacing the floppy goes on general sale this month. See *News Analysis*, page 38

Software houses forced to pay for bugs as users fight back

SLOPPY SOFTWARE VENDORS cannot barricade themselves behind licence cop-out clauses following a landmark court ruling which could lead to a flood of damages claims.

Licence terms are often heavily weighted against users, limiting recompense to the cost of the package – even if a business has been seriously damaged by bugs.

But no-one tested these terms in Britain until St Albans City Council sued ICL over software faults which cost £484,000 in lost community charges. ICL argued that its liability was limited by contract to £100,000.

The Court of Appeal upheld a High Court ruling that a contract cannot override a responsibility to provide reasonably fit code. The ruling will "very much" apply to licences that come with shrink-wrapped packages, says Katrin Turner, IT contracts specialist at solicitors Davies Arnold Cooper. Complex software cannot be bug free, so damages claims will hinge on the meaning of "reasonably fit".

Companies could decide to soften licence terms to make them more acceptable to courts. But Turner said: "I think they will stick with their present licences in the hope of scaring off potential court actions. If it doesn't work, I think any solicitor would advise companies to settle out of court to avoid damaging publicity."

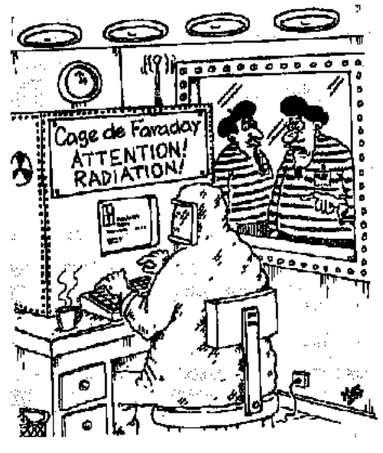
She said the St Albans case was part of a "general move worldwide to make software companies more accountable."
Davies Arnold Cooper 0171 936 2222

French flog good vibrations

FOLLOWING A HEALTH and Safety Executive warning last month against "bogus and misleading advice" on VDU health risks, we would be the last to point to French firm Tecnosphere which is flogging an aerial called Tecno AO to stick on your display to "counter stress and other problems associated with VDU operation."

"The continuous and perfectly regular oscillation of the Tecno AO antenna counteracts all biological effects caused by the multifrequential radiation cast off by the monitor. Its main oscillation frequency is 12Hz, which is in resonance with the alpha rhythm frequency emitted from a non-stressed brain," says the company's blurb, put out by no less than the official French Technology Press Bureau in London.

A spokesperson there said: "We based the information on UK regulations." The HSE insists that there is no evidence of health risks from VDUs. Still, the aerial could give new meaning to the phrase "propellor head".



"'E says 'e will believe zey know the VDU is long-term safe when zey show 'im someone who has been using one for 40 years."

Jessica Hodgson

Short Stories

Taiwanese RAM chips 'will keep prices low'

■ Memory chips from a new Taiwanese plant will ensure that RAM prices will continue to fall – even though some companies have suspended production to force up prices. The Vanguard plant, privately owned but government founded, will sell to dealers and PC builders through a new company called Vanguard Microelectronics.

Managing director Roy Taylor said Vanguard's efficiency meant it could keep its prices low and it did not need to peg them to the terms of existing long-term contracts. "It will be like processors. Rather than paying less, you will get more for your money… 4Mbit and 8Mbit SIMMs will be phased out and you will start at 16Mbits."
Vanguard 01604 859542

Wind of change

■ Tired of your keyboard getting clogged up? The makers of this device claim to have the answer – and as the Amercians say, it really sucks. The mini-vacuum is part of a cleaning kit available for £9.99 from Jessop Shops, on 0116 232 0033

Thrilling news

■ Windows 95 is set to outsell Michael Jackson's Thriller, having matched its 40 million sales in the space of a year.

Some chance

■ Results and other information on the national lottery are now on the Web at www.national-lottery.co.uk

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Head rolls as Novell launches NetWare 4.11

NOVELL, STILL BY far world leader in local nets, has ousted chairman Bob Frankenberg and relaunched itself as the "intranet company" with web-enabled upgrades of its flagship products NetWare and Groupwise.

The move mirrors Microsoft's massive swing to the web, but many believe it was not made fast enough, which was one reason for Frankenberg's departure.

Novell officials were swift to portray Windows NT 4.0 as an opportunity rather than a threat, though most analysts believe it will lose some market share to NT.

The long-awaited web-enabled version 4.11 of NetWare, codenamed Green River, is available this month as part of a bundle called IntranetWare. Technical director Dominic Storey said users who upgrade to 4.11 could continue to run a NetWare system as usual but could transform it into an intranet (i.e. using web protocols and browsers) when they chose.

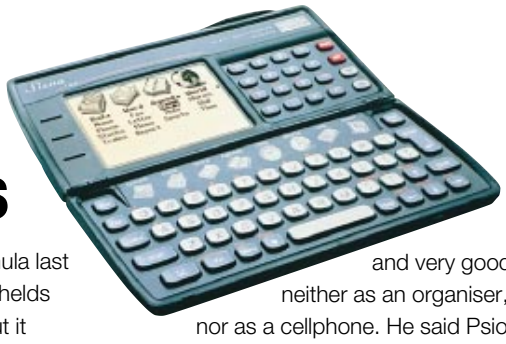
Netscape Navigator is used as a front-end for the system, which has full firewall-protected internet facilities, even if it is not run as an intranet. There have been persistent rumours about an imminent Netscape takeover of Novell, or vice versa.

Groupwise 5, the latest version of Novell's messaging, includes a universal mailbox that can be accessed from anywhere on the web.

The new Novell president, Joe Marengi, was described by UK MD Tom Schuster as "an ideal leader to bring a new urgency to our business." But at press time, Novell was still looking for a figurehead CEO.

● *News Analysis,* page 40;
NT launch round-up, page 30

Corel joins ranks of Psion rivals



PSION STUCK TO its winning formula last month by launching two new handhelds with more style than innovation. But it faces fierce competition. Corel, which has been working on a Java version of WordPerfect, announced that it will ship a Web-enabled colour handheld next year based entirely on Java.

This makes it in effect a mobile network computer, sufficient unto itself for basic work but able to tap into networked or PC-based resources – surely the way mobiles must go.

But Psion is not necessarily wrong in holding back: as the Newton showed with handwriting recognition, it is dangerous to enter the market with immature technology.

Psion MD Philip Norman made this point at a press launch when he described the Nokia 9000 dataphone/organiser, which has finally reached the shops, as too heavy and very good neither as an organiser, nor as a cellphone. He said Psion would produce an integrated machine only when the technology is ready. (Norman told *PCW* last month that the voice control is a possible feature for the next-generation Psion Series 4.0.)

The latest Psion 3c looks much like the 3a but includes an infra-red port and a standard PC serial port – both of which have been on rival models for years. Backlighting is offered on US but not UK models, which is likely to infuriate British users.

Also launched was a cut-down version called the Siena (above) which I have quite taken to. I never found the 3a big enough to type on, and the smaller model can still pack data downloaded from a PC.

Psion 0171 262 5580 **Clive Akass**

● Windows PDA, p24; Reviews, pp64/66

Short Stories

Going, going...

■ ShoppersUniverse has launched an online auction room with its online shopping mall. The auction room allows shoppers access to a split screen. One half displays information about all bids and who has placed them, the other contains a secure input form.
www.shoppersuniverse.com

Cheaper Toshes

■ Toshiba has cut notebook prices by up to 25%. The high-end Tecra 500CS, which includes Zoomed Video Port technology, now costs less than £3,000. There is also a new 2Gb version of the Tecra 720CDT.
Toshiba 01932 828828

Travel kit

■ Xircom has released an International Modem Travel Kit which contains international telephone adapters that convert country-specific connectors to the British standard modem connector, the RJ11. Two kits are available, covering different areas. Both cost around £58.
Frontline 01256 332552
www.xircom.com

Java tool

Sun has launched Java Workshop, a £80 kit for creating Java applications graphically. A 30-day evaluation copy is available at
www.sun.com/developer-products.
Sun Express 0800 898888

■ This wireless modem costs £149 and connects to a PC serial port to transmit data at 2400 baud over distances of up to 200 metres. It can operate off a PP3 battery, and talks at either 418MHz or 433MHz.
RF Solutions 01273 488880

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Short Stories

Buy PCW index to help Amnesty

■ Codehigh is offering the new Windows version of Inside Information, which includes a three-year reviews index to *Personal Computer World* and other (i.e. lesser) PC titles, for a £25 donation to Amnesty International. The database normally sells for £145.

The utility references 20,000 reviews and gives details of more than 6,000 products, with phone and fax numbers for 2,000 suppliers. The offer ends on 31 December.

Send a cheque for £25, payable to Amnesty International (Basingstoke Group) to Codehigh Ltd, Sedgewell House, Sedgewell Road, Reading RG4 9TA.

Codehigh 0118 972 4905

■ You may have thought dot-matrix printers were a thing of the past, but they are still, so to speak, making an impact in the likes of billing systems. This new 136-column TP45 from Tally costs £1,295.

Tally 01734 788711

Schools offer

■ MJN Education is aiming its 100MHz Pentium P100-8 ClassPC at the schools market. Prices start at £959 for a base model with 8Mb of RAM, an 830Mb hard disk and a bundle of software.

MJN 01282 777799

PagePlus 4.0

■ Serif has launched version 4.0 of its well-received desktop publishing package, Page Plus, which will sell for less than £100.

Serif Sales 0800 924925

Rent an IBM

■ IBM's new Aptiva 133MHz Pentium Multimedia PC is being sold through Radio Rentals on a no-deposit option-to-buy scheme spread over 39 months.

Cheap modem

■ Electronic Frontier is selling a V.34 modem for just £79+VAT.

Electronic Frontier 0118 9810600

Logitech's USB first

Six new products from Logitech include a 24-bit hand scanner which is the first peripheral we have seen to use the new USB bus that is set to replace the serial and parallel ports. The cordless internet controller (left) provides remote access to surfing commands. There's also an improved version of the Cordless Mouse Man (below), a radio-controlled mouse with customisable buttons, and a two-handed joystick with a 360 degree spinner knob.

Logitech 01344 894300; www.logitech.com

Hitachi thrilled to bits over MPEG camera

Barry Fox in Tokyo

HITACHI'S ENGINEERS IN Japan believe they can change the course of video history by making the future camcorder a computer peripheral.

Sales of conventional analogue camcorders are slow. Most of the major manufacturers have been developing digital video recorders and cameras which use the Digital Video Cassette tape standard. But Hitachi has rejected DVC, and has designed a single chip that encodes moving pictures to MPEG in real time.

The same chip also decodes MPEG in real time, and it can code and decode still pictures to the JPEG standard. Hitachi's chip runs at 3 volts and consumes only 600 milliwatts. This has let the company build what it calls the MPEG Camera.

The MPEG Camera weighs only 540gm and looks and feels just like a rotary-head shaver. There is a high-resolution CCD sensor and lens on the front, and a colour LCD screen the size of a large postage stamp on the rear, which acts a viewfinder. Inside the stem there is a slot for a PCMCIA hard drive: a 340Mb one will store either half an hour of better-than-VHS-quality video, 3,000 still pictures or four hours of sound.

DVC, says Norio Ogimoto, head of Hitachi's Products Planning Group in Japan, is "too heavy with digital bits and impossible to use with multimedia computers."

Although PCs and low-cost Video CD players can play back MEPG-1 video from CD sources, using hardware or software decoding, it has hitherto been thought far too complex to harness MPEG for recording in a small consumer camera.

MPEG requires far more processing power to compress and code video sequences than to decode them. It gets 100:1 compression (to around 1.5 Mbits/sec) by comparing groups of up to 15 pictures at a time, and coding just the differences between them. Real-time encoding has so far required racks of power-hungry equipment Most coders still take hours to process minutes of video.

p30 ➢

Entry to NT 4.0

The gold code of Windows NT 4.0 reached us shortly before press day. VNU Labs technical director Julian Evans gives his first impressions of the desktop version and the results of preliminary tests.

WE HAVE TALKED about the main features of NT 4.0 in our previews [*PCW* August], and said that this could be the big one. The beta features list has more or less survived into final code, including architectural changes like Fibres, the privileged (ring 0) display subsystem, and Direct-X screen APIs.

Subjectively, the performance of simple desktop operations is adequate but not amazing. We recorded that logging on and connecting to a NetWare file server takes eight seconds or so longer than under NT 3.51. Depending on whether you use the File Manager or not, copying and moving files takes either about the same time, or a tad longer. All versions of NT are appallingly slow to boot up.

Memory needs are down from the tonnage needed under 3.51. For an NT workstation running four or five assorted DOS and Windows applications, 24Mb is adequate. Developers running a slew of C++ compilers and other complex software will probably still need 32Mb.

Busy servers running applications like Lotus Notes or the MS Internet Server are likely to require 64Mb or more: this is needed to maintain adequate disk caches, although simple file/print serving can be run on a more modest system.

Hopes that plug-and-play features would be found in the final code are dashed, so mobile and home users should stick to Win95. But NT scores over Win95 for stability and network features.

NT is easier to load than mainstream Unix variants or Novell NetWare, and is only as hard as OS/2 or Red Hat Linux. But we did have problems installing. Our SoundBlaster AWE32-attached CD-ROM was not auto-detected; later, the SoundBlaster driver reverted to an old version, so the card could not operate at its full potential.

Next, we had a couple of BIOS/CMOS related hitches, one of which caused loss of data. Hard disk settings for the slave drive on the primary IDE chain became corrupted during setup; later, the partition table was destroyed. We reverted to MSDOS to fix the problems, but the lesson is that a full backup is vital before changing your OS.

The Award Energystar BIOS in another of our test systems also suffered problems to do with drive geometries. In fairness, NT 4.0 detected the problem, but didn't offer much help in fixing it.

Many operating systems make reasonable attempts to detect and use LAN adapters, and even to configure non-default IRQ and port settings, but NT 4.0 won't necessarily do so correctly. Detection of NE2000-compatible cards gave no problems, but the IRQs were wrongly left at their default (IRQ3). An SMC Ultra Elite card also proved difficult.

For testing Windows NT 4.0's performance against v3.51, we used a mixture of application-based and component-level tests. We concentrated solely on the Intel version of the tests for this issue, although Power PC versus Intel testing is also in beta at VNU Labs. To test Microsoft's claimed speed gains in graphics performance, we used a Pentium 100MHz-based NT Workstation system fitted with a typical graphics card (a Diamond Stealth), and ran a selection of graphically-intensive tests including the new Intel Media test. This exercises the display more than most applications, running both motion video and graphics processing tests. In graphics processing, we measured a 14 percent gain from NT 4.0, while movies ran 7.3 percent more efficiently.

Our application tests also demonstrate useful speed gains in NT 4.0 Workstation. Database applications (we tested Access, FoxPro and Visual dBASE) all ran VNU Labs' standard SQL/Reporting tests faster: FoxPro, for example, shows a 33 percent lift in SQL query speed and printed its report to file 12 percent faster. Microsoft Excel and Lotus 1-2-3 ran the spreadsheet tests on average almost 12 percent faster, with Lotus completing its calculations in 152 seconds rather than a ponderous 165 seconds for v3.51 (7.8 percent faster), and Excel 7 steaming ahead with a 16 percent boost.

The application mix used for these tests consists of Excel 7, Visual dBASE v5.5, Lotus 1-2-3 Release 5, Word for Windows versions 6 and 7, FoxPro for Windows v2.6, Access for Windows 95, CorelDraw v6, Netscape Navigator v2.2 (32-bit) and WordPerfect 6.1 for Windows, and after weighting the figures we measured an overall improvement of 14 percent. Not quite up to Windows 95's performance levels yet, but, at last, usably fast for most desktops.

In the next series of tests, to be run over the next month, we will be measuring NT's capabilities as a server platform, with special focus on Microsoft's claims about scalability across multiple processor systems.

	NT 3.51	NT 4.0	Difference
Applications Test	100	113.7	+13.7%
Intel Media Tests			
Image Processing	56.82	48.87	+13.99%
MPEG Video	59.88	55.46	+7.3%

Industry jitters over new OS

HARDWARE AND SOFTWARE vendors have got the collective jitters with the launch of Microsoft's industrial-strength operating system, Windows NT 4.0, which could have a bigger impact than Windows 95.

Many companies have held back from upgrading from Windows 3.x to await the workstation and server versions of NT which have a Win95 interface, allowing machines from the desktop to the back office to have a standard look and feel.

The ousting of Novell chief Bob Frankenberg (*see p40*) was symptomatic of the anxiety among Microsoft's rivals. Hardware vendors were generally hoping the launch would boost sales of NT-ready workstations and servers (*see below*).

But Silicon Graphics, which has traditionally sold costly graphics workstations, readied its cheapest-yet model to keep the Unix flag flying on desktops *(see picture)*.

IBM, which was due to launch version 4.0 of OS/2 Warp, issued a white paper on the perceived advantages of Warp Server. It claimed this was a better, more scaleable out-of-the-box network operating system than either NetWare or NT, with a relatively low cost of ownership.

Silicon Graphics' 64-bit O2 workstation brings high-end graphics to the desktop (*review next month*)

Hardware vendors hope for sales boost

HARDWARE VENDORS PREDICT a massive shift to NT in business systems with the launch of version 4.0. David Townsend, Digital's PC business unit manager, says there is a huge pent-up demand in companies still using Win 3.x systems.

"A lot of pressure is coming from managers who have Windows 95 on their home machines and like the interface [which is also used on NT]," he said.

Digital boasts that it has the greatest spread of NT machines, ranging from basic desktops to servers. It is also well poised to take advantage of a possible shift from Intel processors – NT runs on RISC as well as x86 architecture, and 60 percent of Digital's business still stems from systems based on its Alpha RISC chip. Townsend said: "Customers will go for machines that best run the application they want to use."

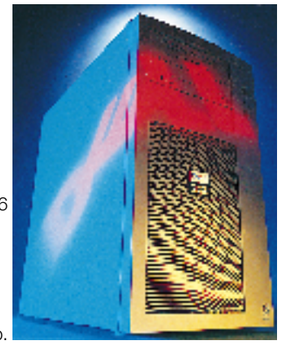
Digital Celebris GL

He believes NetWare will hold on in print and file server systems but will lose ground to NT in applications-led environments. But Unix will still hold sway at the conservative high end. "We have clients who need to address 20Gb of memory. You can't do that with NT, not yet," Townsend said.

Dell is getting in on the act with a range of Pentium Pro-based servers. The entry-level PowerEdge 2100 is available now, the dual-processor 4100 ships next month, with the four-processor 6100 to follow.

Both Dell and Digital are chasing Compaq's overwhelming 40 percent market share of mid-range systems.

Digital 01734 868711; Dell 01344 720000



The Dell PowerEdge 2100 server

Short Stories

Microsoft and PCs 'have had their day'

■ NT is not short of detractors, depite the fear and loathing it has inspired among rivals. UK analyst Robin Bloor goes even further by saying Microsoft and Intel both face cuts in growth and profits that cold even threat their viability.

He argues that computing is undergoing a "seismic shift" to the network, based on centralised power but much more flexible and complex than in the old mainframe days.

Hugely powerful servers, using many processors in parallel, will be accessed by "thin clients" (also called network computers) which will eventually displace PCs from corporate networks.

He believes this will reduce the IT cost per desk as much as fivefold. One result will be a fall in demand for NT, which is not sufficiently scaleable for the emerging parallel systems, Bloor says in a report.*

Microsoft has been slow to adapt to the internet and Java, and the chips used by the thin clients will be cheaper and easier to program than Intel's, Bloor says.

The PC market will enter an irreversible decline as soon as autumn next year, he predicts.

* *The Enterprise by other means: An anaylysis of the Return to Centralised Computing and its Consequences;* from the Bloor Research Group at 01908 373311 or www.bloor.co.uk

Windows on the web

■ An NT 4.0 version of NTrigue which allows non-Intel platforms to "run" server-based NT apps, will ship next year, says developer Insignia Solutions. Meanwhile, it has released a web kit which

NTRIGUE Web Kit

allows sites to make Windows applications available to users who download client software.

This means web designers can use standard Windows progams rather than Java to interact with users. One use would be for demo software, or for disk-based promotions.

Insignia 01494 459426; www.insignia.com

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Short Stories

See, see… it's the new cc:Mail 7.0

■ The new 32-bit version of cc:Mail includes several new features to fight competition from web-age email packages.

But, coining an impressive euphemism for "not yet", Lotus says cc:Mail Release 7 includes "support for future access" to web mail protocols. This turns out to mean that it will soon support POP3 and AMAP4 messaging. The new version can already access multiple MAPI postboxes.

Release 7 ships next month in the US and runs on Win95 and NT; a Win3.1 version will appear later this year. New features are message threading, nested folders, collapsible headers, message sorting, custom views, rich text, and the ability to delegate mailboxes.

Lotus 01784 455445

■ UK-based TopLevel's Forms product sold a claimed 400,000 in the US; now it has come up with a new package designed to work with Microsoft Office.

OfficeForms looked fun as well as useful, from a brief demonstration we were given, and is more than a form designer. You can, for instance, use a form to create a simple database or inject the data into Access. For £99, you get both 32-bit and 16-bit versions. Watch out for a full review in *PCW*.

TopLevel 01453 753955

■ Designers Edge is said to help you create programmes to train staff in multimedia authoring.

BIT 0171 251 5080

Demon to sue over 'child porn' claim

DEMON INTERNET IS to sue *The Observer* over a front-page article that pilloried director Clive Feather as a "pedlar of child porn" on the grounds that the company provides access to paedophile material – something that could be said of all service providers, not to mention the post office.

You can find scores of "adult" sites like this within seconds on the web, even if your local server is censored

In a follow-up piece, the paper reported: "Within days of the article … Demon Internet proposed a series of measures to police and the DTI which could restrict access to a number of newsgroups containing explicit paedophile material."

But a Demon statement denied that it had acted in response to the article. It said that three weeks before the publication it had adopted Microsoft's Internet Explorer 3.0 browser, which allows parents to restrict access on the basis of the new PICs site rating system *(see Newsprint, October)*.

In May, Demon denounced UUNet Pipex's decision to ban certain newsgroups as "playing politics". Marketing manager James Gardiner said censorship of newsgroups is impractical. "You can't read over 500 million words in a day."

Internet providers and DTI officials met last month to discuss self-regulation measures. One argument for the PICs system is that local censorship does not prevent material being accessed on remote servers.

Chief Inspector Stephen French, of Scotland Yard's Vice Squad, sent a list of 134 newsgroups to the Internet Service Providers Association in August, with a request that they "move quickly towards the eradication of this type of newsgroup" and identify and take action "against others found to contain such material."

The ISPA said it was happy to "to ensure the list was kept up to date." Demon is not a member but UUNet-Pipex is. Its communications director, David Barrett, described Demon's approach as irresponsible.

But Stephen Dyer, chairman of the Mailbox email and domain-naming service, said censorship could make matters worse. "The Internet has a top shelf. We can make it quite difficult for kiddies to get into it. So if you take away the shelf, you let loose the material into other areas."

Pipex launches web shopping

UUNET PIPEX HAS launched The Bureau, a system that enables people to buy and sell consumer goods over the internet. The company's Richard Nuttall described it as "the missing piece in the electronic commerce jigsaw."

He added: "We have created a comparatively low-cost system that is more secure than buying goods on an ordinary credit card or credit card by phone or in a shop."

Nuttall predicted that merchants would be trading over the internet using The Bureau within a month.

Users submit their credit or debit card details only once. These are encrypted and then stored behind a firewall with no direct access from the Internet.

NatWest will act as The Bureau's clearing house for all online debit and credit transactions. The Bureau interface can be customised to a merchant's brand. Users can browse a virtual shop and buy by filling in an order form.

Nuttal said at least four companies had already signed up.

www.uunet.pipex.com

Jessica Hodgson

'Pirate' DIR CD-ROM slammed as intrusive

A £20 CD-ROM of all the data in the BT phone books has been slammed by BT and others for threatening customer privacy.

UK Info, from German-owned TopWare, contains over 16 million entries with full names, addresses and telephone numbers. It also offers a reverse search facility, so that an address can be found from a telephone number.

BT press officer Simon Goulden said: "This product is in breach of customer privacy. We will take all steps to prevent infringement of customer rights." BT also believes the product is two years out of date.

BT's protest rings a little hollow considering that for years it has been selling CD-based directories to telesales firms who rely on making unsolicited calls.

It charged £2,000 for early CDs at the same time as imposing heavy charges for DIR calls. An official CD now costs around £199 – about ten times the price of its equivalent in the US, where phone numbers are considered public property.

A spokesman for the Data Protection Registry said: "There are very serious security implications with this product. A woman who moves out of an agressive relationship won't want an estranged, possibly violent partner to track her down."

TopWare's Natalia Kuck said: "We haven't had any cases in Germany of the product being abused. What has been quite good is that people can look for lost friends."

TopWare CDs also skirt UK law by using an image of the Queen (albeit a model)

UK Info can be ordered via CompuServe on Go Top Forum or on the Web at www.topware.com

Jessica Hodgson

Office 97 applications merge seamlessly into the internet

MICROSOFT HAS ACKNOWLEDGED that its soon-to-be released Office 97 suite will be the first to achieve the company's goal of integrating all applications completely into the internet. The suite has a newly-designed interface, similar to that of Internet Explorer 3, and a barrelful of new features. Microsoft expects it to take the market by storm.

The company says the suite will eliminate the need to learn HyperText Markup Language (HTML) to set up pages on intranet and internet sites.

New features include automatic hyperlink creation, integrated email, a more intuitive (and animated) Office Assistant, and Office Art (including some animation capabilities).

All Office 97 components, including new applications such as Outlook, incorporate Microsoft's ActiveX controls, the heart of internet application integration.

Microsoft also claims, in a reversal of its past history, that Office 97 will actually reduce the amount of hard drive space it occupies compared to Office 95. This has been accomplished through more shared code and components, such as Office Art, throughout the suite.

We are set to receive final beta versions, so expect to hear more about Office 97 in *Personal Computer World* before its official launch next year.

Dylan Armbrust

Tim Bajarin reports from the US

■ The broswer war continues apace, with Netscape and Microsoft releasing rival versions 3.0, and versions 4.0 due within six months.

Netscape fired the most recent salvo with the formation of a new company called Navio Communications to bring its Navigator to non-PC devices like smart phones, set-top boxes, and TV/CD systems like Apple's Pippin.

Netscape is working with electronics companies like Sony, Nintendo, NEC, Sega and IBM. Its open approach, which seeks to allow Navigator to sit on any operating system, gives it a real edge over Microsoft in this area — at least for now.

Navio will probably force Microsoft into the open about its own strategy to get its Explorer and Win95 interface on digital appliances. But it is hampered by its Intel x86 and DOS/Windows legacy, with the need for backwards compatibility.

Navio is headed by Dr Wei Yen, who previously ran product and software operations at Silicon Graphics. Netscape founder Jim Clark has been named as Navio chairman.

■ BroadVision's hot new web site at www.theangle.com is the first to let you customise the information you receive.

The idea is similar to PointCast, which delivers news as a screensaver but offers limited user control. The Angle lets you set preferences and "angles" on the basis of which its agent trawls the net on a 24-hour basis to get "your" information in the form of a personal newsletter.

Another interesting site is Talk City (www. talkcity.com), set up by former Apple eWorld director Peter Friedman, with financial backing from other former Apple luminaries John Sculley and Joe Graziano.

It uses Internet Relay Chat (IRC) facilities for scheduled discussions of key topics — an idea especially attractive to vendors of products or services who want customer feedback and new ideas.

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Short Stories

Year of VR

■ 1997 looks to be the year of virtual reality CDs. The most exciting is Anglia Multimedia's Virtual Safari, which uses Superscape technology to let you wander the savannah watching and photographing animals.

Also interesting is Steven Spielberg's Director's Chair. You can move around a film studio, write the script, shoot scenes, edit footage and sound, and screen your finished work.

ISDN concession

■ BT has moved marginally over its heavily-criticised £400 ISDN sign-up charge by offering various easy-payment options. Details are at www.bt.co.uk

Dogged Navigator

■ The next version of Netscape Navigator will support Apple's Cyberdog web suite and Open-Doc component architecture.

Philips licenses 'electronic paper' display technology

A REVOLUTIONARY screen technology that emerged from Cambridge University has been licensed by electronics giant Philips.

It uses Light Emitting Polymer (LEP) sheets that will potentially produce more light for less power than LED screens. They light up only at a point of electrical contact, enabling an image to be defined by a simple electrode mesh. Also, they are flexible, giving the potential of paper-like screens. All basic patents are owned by Cambridge Display Technology, a university spin-off.

The first LEP devices will be backlights. Dr Robert Visser, head of polymer research at Philips, said LEP screens are years away.

● Small extra-bright colour screens developed by Sharp for portables enable more powerful, compact LCD projectors, says presentation specialist Liesegang. It is selling the £5,995 7lb EzPro 550, which uses one to create 800x600 images in 24-bit colour for PC-based presentations. It will also screen video from standard sources.

Clive Akass CDT 01223 276351

Pentium chips in short supply

Space station interior from the new Maris MMX CD

Intel Pentium 200MHz chips are in short supply. Gateway has a reported backlog of five weeks for delivery of P200 systems and is offering consumers Pentium Pro systems running Windows 95.

Gateway recently launched a 180MHz Pro system which it claims can run 16-bit code up to 20 percent faster than a Pentium: most tests have shown the chip to be sluggish unless running pure 32-bit apps. (See next month's *PCW* for our verdict on the claim.)

The shortage of fast processors for Christmas has been exacerbated by Intel's decision to delay until February the release of the first P55C processors with MMX multimedia extensions.

● Maris is developing one of the first CD-ROMs for the new MMX processors. The first elements of Space Station Simulator, a simulation of the NASA "lab in the sky", are due late 1997. The simulation was built from plans taken from NASA and Boeing internet sites. The MMX architecture allows impressive 3D rendering, so the VR interface moves fast enough to give you the impression you are floating. **Adele Dyer**

Top 10 Windows software

			Last month
1	MS Windows to Windows 95 U/G	Microsoft	1
2	WordPerfect Suite for Windows 95	Corel	-
3	Encarta 96	Microsoft	3
4	Uninstaller v3.5	RMG	6
5	First Aid for Windows 95	RMG	4
6	WordPerfect Suite for Windows 3.x	Corel	2
7	MS Office 4.2	Microsoft	10
8	Hurricane RAM Doubler	RMG	5
9	Partition Magic	POW	-
10	McAfee VirusSCAN 3.1	McAfee	-0

Top 10 DOS software

1	System Commander	POW	-
2	Flight Simulator v5.1	Microsoft	2
3	Flight Sim. NY/Paris	Microsoft	4
4	MSDOS v6.22	Microsoft	1
5	Formula 1 Grand Prix 2	Pinnacle	-
6	Turbo C++ v3.0	Borland	8
7	Duke Nukem 3D	US Gold	3
8	Procomm for DOS	DataStorm	-
9	Worms	Ocean	-
10	DOS to Windows 95 U/G	Microsoft	5

Top 10 CD-ROMs

			Last month
1	Organic Art	Warners	1
2	The Unexplained	Flagtower	2
3	Bodyworks 5	Softkey	3
4	Cinemania 96	Microsoft	4
5	Encarta 96 Encyclopedia	Microsoft	5
6	Autoroute Express: UK & IRE	Microsoft	6
7	Star Wars Trilogy	Acclaim	7
8	Print Artist	Sierra	8
9	Ultimate Enc. of Soccer	Electronic Arts	9
10	Windows 95	Microsoft	10

Top 10 peripherals

1	Epson Lapcat GT-300 scanner	Epson	-
2	Creative Labs 4-speed CD-ROM	Creative Labs	-
3	16-bit sound card	Software W'house	5
4	8-speed CD-ROM	Aztech	6
5	ScreenBeat, Hitex passive speaker	Hitex	4
6	Epson Colour Stylus 500	Epson	7
7	Creative PhoneBlaster	Creative Labs	-
8	US Robotics 33,600 fax modem	US Robotics	-
9	Umax Vista S6E flatbed scanner	Umax	14
10	Epson Stylus Colour IIs	Epson	12

Software and peripherals figures supplied by Software Warehouse. CD figures courtesy of HMV Games/Level One

Superfloppy **firms up**

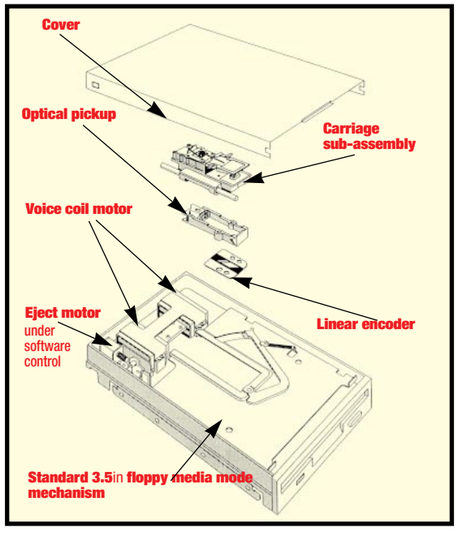
Out of the Iomega stable, and now under new management, the a:drive/ LS-120 could supersede the floppy for convenient backup. Clive Akass reports.

Did storage specialist Iomega give away the IT equivalent of a hen that lays golden eggs, following in the hollowed footsteps of IBM (which gave Bill Gates the PC software industry) and Xerox (which gave the world the graphical interface)? Time will tell, in the form of sales figures of the LS-120 superfloppy drive, which becomes generally available from this month under the name "a:drive". Currently, it is sold only on high-end Compaqs.

An Iomega-owned company did the original work on the device, which reads 120Mb disks as well as standard 3.5in floppies. European general manager, Siri Nageshwar, says Iomega rejected the technology as too slow and considered that backwards compatibility was unimportant. Instead, it sold the company to concentrate on the Zip, which is faster and reads 100Mb cartridges but not floppies.

According to Mike Dalton, communications director of OR Technology which now owns the basic patents, Iomega sold off the technology because it was strapped for cash and couldn't develop both projects at once. This, he says, was a very bad move.

The a:drive may have a name that seems specifically designed to confuse users (and you can already hear the questions: "Why is this D: drive called the a:drive?") but it has big backers in 3M and Matsushita. Compaq is simply a customer.



An exploded view of the a:drive. It stores data magnetically like a floppy, but the increased data density needs a more accurate location system. This is provided by a laser system which uses optical "stitches" between magnetic tracks on one side of the disk to position the head

It looks exactly like a floppy drive and fits into a standard floppy half-height slot. At Microsoft's request it has a software-controlled auto-eject, so that the operating system can keep track of the comings and goings of disks, a source of much confusion to Win95.

The 120Mb disks look similar to a 3.5in floppy and are the same size, but cost £13.50 each. The drive will initially cost £160 but you can subtract from that the cost of the floppy drive which it will replace. This means that it will add about £140 to the price of new systems, a cost that could drop drastically with big sales.

OR will not market the drives as upgrades, although suppliers may offer them as such. One problem is that they need a BIOS change to be bootable like a standard A drive. Phoenix already supplies a suitable BIOS and Promise offers an add-on card, costing less than £30, which provides the BIOS functionality.

OR has 100,000 to sell this year but says that by January, Matsushita will be turning out 100,000 a month. Prices will fall drastically as sales rise. If the device had been ready when the Zip came out, when Compaq was panicked into pre-announcing it, it would probably have been a standard fitting by now. Even the buoyant Dalton admits that the market is now more complex.

CD recorders are reaching consumer prices (*see p24*), DVD drives will start to appear next year, and both Syquest and Iomega offer fast, fairly cheap, 1Gb-plus removables. Dalton claims sales of the Zip drive have levelled off, having exhausted its natural market. But millions of Zips have been sold, making the cartridges viable as a common medium of exchange data, and Iomega offers an internal version that can also be fitted to new machines, in addition to the floppy drive.

The main advantages of the a:drive/LS-120 are backwards compatibility and standard size. It fits into a standard desktop floppy slot and a thin notebook version is in the pipeline. It reads standard floppies faster than existing drives but is slower than the Zip, itself relatively sluggish. OR claims 400-680Kb/sec sustained transfer rate, compared with the Zip's 1.4Mb/sec — average seek time is slower too, at 70ms compared with 29ms.

Dalton sees its major use as a convenient backup medium, where speed is less important. He believes that the a:drive, likely to be licensed by other manufacturers, will virtually replace the standard floppy by 2000AD. That would make Zip sales look like chicken feed. If he is right, you can expect loud sounds from Iomega, stage right, kicking itself. ■

Destination anywhere

The convergence of PC and TV technologies has emerged in the form of Gateway's Destination. Tim Bajarin views it from all angles.

A PC which Gateway 2000 showed me privately at Comdex last year, has sparked a debate that will have a major effect on 1997 designs. The PC system box, which included a card-based TV tuner, looked like part of a hi-fi and had a Mitsubishi monitor with a screen of no less than 31 inches.

Gateway launched it this spring as the Destination, driven by a 166MHz or 200MHz Pentium and complete with an eight-speed CD drive and a 32-bit sound card with surround sound. A wire-less keyboard and remote control with a thumb mouse allows you to control the system in PC mode from up to ten feet away.

It sells for about $3,995, clearly an upscale purchase. At the time I met Gateway, the market positioning of this system was a point of hot debate. Top executives saw it as a machine that could bring the PC into the living-room and wanted to emphasise it as a home computer. Others within Gateway thought it should be targeted initially at the business market, as a training or presentation system. In the event, the Destination has found its way into homes as well as businesses.

A convergence of PC and TV technologies has been a hot topic since 1983. I saw a combined model, a TV with a motherboard inside it, for the first time in 1982. But the PC and consumer electronics industries take different slants on the idea: computer people want it to be a PC that lets you view TV; the others see it as an entertainment device that happens to function as a PC.

The Destination has caught the attention of both camps as the most practical short-term way of merging the PC and TV. Microsoft has announced a reference model called the Broadcast PC (BPC) with the aim of steering the PC/TV to the Windows platform. The specification includes provision for digital broadcasts and Microsoft is looking closely at the Hughes DirecPC concept of satellite delivery of internet data. The company also seeks to cut $1,000 off the price of the Destination to give it a broader appeal.

At some point in the future, the TV world will clearly switch fully to digital broadcasts and eventually digital HDTV will be a standard. That is probably a 15- to 20-year process. But there is already a need to link PC functionality to the TV, to allow viewers instant access to web links in advertisements or programs.

The current Web TV approach is too limited in functionality to attract traditional, entertainment-driven TV viewers to the web. But the Destination approach has much merit, and as BPC models from many vendors go onto the market and the competitive element kicks in, you can imagine existing PC users putting a PC/TV into the living-room as a second machine. ■

IBM back in fast lane, but embarrassed by poor showing at the Olympics

When Lou Gerstner became head of IBM, it was a floundering giant. Three years later, it is healthy (albeit minus thousands of employees) and viewed once again as a powerhouse.

Riding high? IBM's technical coverage of the Olympics got the company a high profile — but not in the way it wanted

This year, Gerstner addressed IBM's annual IT analysts' briefing for the first time and I went along. He emphasised the IBM focus on delivering complete, highly-integrated solutions regardless of whether or not all the technology came from IBM. These systems could involve the use of mainframes, minis, PCs and even the network computer, for which IBM has seen strong demand. Gerstner said that IBM will support Microsoft platforms but provide its own operating software in mission-critical applications wherever possible, and conceded that Microsoft has won, big-time, in the PC operating-system market.

We could not let him get away without explaining what had happened to IBM systems at the Olympics. Ironically, the backbone servers worked flawlessly, said Gerstner, but a bug in the software that sent the scores directly to the media centre took three days to fix and (of course) this affected the reporters, who took it out on IBM.

Another problem was outside IBM's control. The wrong winner was reported in two events because competitors had swapped shirts and were therefore showing the wrong numbers. All that IBM could do was to take the hit graciously, learn from the experience, and hope to do better next time around. ■

p40 ➢

Where to now, **Novell?**

Leaderless and facing relentless competition from NT, Novell is nonetheless steady in the face of adversity. Graham Lea assesses its current situation.

Ray Noorda, patriarch of Novell, gave way to Robert Frankenberg, but now there is a vacancy for a new CEO at Novell following a bloodless coup in the boardroom and Frankenberg's departure. An aggressive and charismatic leader is now sought. Hindsighters have been quick to exhibit their superior insight by pointing to the financial wounds suffered by Novell following the acquisition and disposal of Unix and WordPerfect. They conveniently forget that, at the time, there was a real chance that Novell would have proved a formidable competitor for Microsoft in the desktop arena had Microsoft's anti-competitive practices been curtailed by the US Justice Department in its anti-trust case against MS.

When Frankenberg took over, PerfectOffice was unable to compete with Microsoft's preloading deals for MS Office because Microsoft charged higher prices to PC-makers who pre-loaded rival products. Teeth were pulled at Novell without an anaesthetic: during the nine quarters when Frankenberg was leader, there were six quarters with lower earnings. Share prices and morale slipped steadily.

Robert Frankenberg was not deemed tough enough to guide the company through troubled waters

Frankenberg did put a realistic strategy into place for the next five years, but was late to seize the opportunity offered by the intranet, for which NetWare was ideally positioned. IntranetWare's final release in August, complementing Novell's Web Server and InnerWeb Publisher, was overshadowed two days later by the announcement of a 32 percent fall in revenue for that quarter. A week later, Frankenberg resigned. He had reduced Novell's 22 product groups to two, re-jigged the marketing and sales organisation, set the new product strategy and planned the road to Novell's recovery. However, he is evidently not thought tough enough to be the leader Novell now needs to carry the plans forward. The adoption of an active rather than passive policy towards Microsoft began with the promotion of sales VP Joseph Marengi to president, while board member John Young, a former Hewlett-Packard CEO, was appointed as temporary chairman and acting CEO.

The key elements of Novell's Net2000 roadmap include smart LANs with the merging of NetWare and the internet, smart network linking, APIs for network services for cross-client, and cross-application servers across networks. Also, GroupWise extensions to link email, calendars, group working, document management and retrieval, telephone, fax and subscriber directories and, in the fullness of time, NEST. This latter is Novell's embedded systems technology that is on the way to linking intelligent devices, where Microsoft at Work has failed. Novell's adoption of Java solves its previous lack of a development environment.

While Novell was in the doldrums, NetWare only suffered a two percent drop in market share from 1994 to 1995, according to analysts IDC, although it sees NT overtaking NetWare in about 1999. However, the Meta Group recently estimated NetWare's market share at 67.5 percent for 2000, with Microsoft's share at only 22.5 percent. Dataquest's forecasts have lost credibility in view of their inaccuracies and revisions.

Frankenberg said, in March, that Novell was selling 700,000 servers a year, 400,000 of which were new. This contradicts Microsoft's claim that Novell was not getting new business. At the launch of NetWare 4.11 and GroupWise 5, there was fighting talk such as: "Novell is as sick as everyone else of Microsoft's FUDGE (fear, uncertainty, doubt, greed and envy) when it comes to talking about NT and Exchange".

No doubt Novell had Microsoft's tendency to combine Windows NT Workstation (client) sales with NT Server and misleadingly compare this total with NetWare's sales in mind. Kevin Mannion, director of corporate sales at Novell UK, put NetWare sales at around four times those of NT Server and pointed out that whereas a year ago his customers were thinking in terms of NetWare 4 or NT, they are now seeking to integrate NetWare *with* NT.

While Novell points to BT as having 900 users on one NetWare 4 server, Microsoft does not appear to have any sites with more than a few users for each NT server because of the now well-known scalability problems of NT. Some embarrassed users are returning to NetWare following a fling with NT. Novell surprised Microsoft recently by demonstrating Novell Directory Services running on Windows NT Server. Technically, IBM's Directory and Security Services for OS/2 Warp 4 (Merlin) is likely to provide stronger competition than NT.

The greatest problem for Novell is its loss of mind share in the eyes of users. In Silicon Valley, astute venture capitalists check the number of cars late at night in the car parks of the firms they are considering backing. If Novell's car parks remain crowded and it revives its morale, it should at least keep its position as the number four software company worldwide. ■

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Sounding Off

Oh, to be a columnist for PCW! Michael Hewitt reports from a paella-filled Barcelona, where he discovers the internet can be synonymous with style.

Michael Hewitt

My plans for this weekend have had to be revised somewhat to take into account the fact that I unexpectedly find myself in Barcelona (moral: never get pissed in a pub that's next to a travel agency). And to further mess things up, my once reliable Compaq Concerto has started to self-destruct. Yesterday its carrying handle fell off, much to the amusement of the Heathrow security men. By this evening, I expect it will have suffered a terminal hard disk crash. Still, I suppose matters could be worse. I could have ended up in some dump like Lisbon with a Librex running WordPerfect 6.0.

As it is, I'm in the city of Gaudi, Picasso (he was actually born down the coast in Malaga, but he lived here for a few years, so the locals like to claim him as their own) and Catalan nationalism. Yesterday afternoon I travelled around on the highly efficient Metro system and popped up in various places that the Berlitz guide said were worth popping up in.

There's a wealth of things to see: the Gothic Quarter, the Olympic stadium, a number of palaces, the Picasso Museum, and a curious cathedral by Gaudi, called La Sagrada Familia, which amply demonstrates the dangers of employing cowboy builders. They began way back in 1882, and still they haven't even got the roof on yet.

I'm at the moment bloatedly post-paella, enjoying a bottle of wine in a café on the Ramblas. The Ramblas are shady, tree-lined boulevards that run down from the central Plaça de Catalunya to the harbour. It's where you come if you want to get mugged. The assorted vagabonds, pickpockets and other rogues who prey on the tourists around here are always happy to oblige.

It's also where you come if you think you look dead cool and sophisticated and want everyone else to think it too. Every evening you see thousands of well-coiffeured Catalans poncing around with superior expressions and designer labels. Last night, I propped my sunglasses at the regulation angle on my forehead and joined them. Which is how, mid ponce, I discovered Barcelona's internet café, Insòlit, overlooking the harbour.

What are the words you generally associate with the internet? Nerd? Anorak? Grunge? Mohican? Insòlit is like taking a photograph of somewhere like Cyberia and then looking at the negative. In other words, it's the direct opposite of how you'd expect an internet café to be, based on the stereotypical British model. It's spacious, the food doesn't warrant an investigation by the Environmental Health Officer, and there's precious little risk of any internet "personality" like Davey Winder dropping by to publicise his latest book. In fact, no-one with studs and nose-rings would last very long in there at all. The sea air would quickly corrode them.

I didn't actually realise the place was an internet café until I was well into my second plate of squid rings. Then, by chance, I glanced upwards and saw all the terminals on the upper level. They've divided it up so that the ground floor is a quality brasserie and bar, while the techie section is above and discretely separate. Presumably, this is to stop people getting tapas in their keyboards. Anyhow, it's the way things should be done, .

Six hundred pesetas, which is about £3.30, buys you half an hour of netting, which is normally enough for anyone. There are a dozen or so Pentiums, running Windows 95 and Netscape. They're well-spaced, each on its own separate table, so there's no risk of accidentally elbowing a señor or señorita in the side if you mouse too energetically. And — a damn civilised touch, this — they have a fully-equipped cocktail bar up there, plus a waiter. So, as you telnet into something meaningful, you can simultaneously enjoy a Tequila Sunrise and magnificent views of the Barcelona seafront.

Which I did, alongside other revellers. "Do you come here often?" I asked a refreshingly tattoo- and stud-less girl on the terminal beside me (it doesn't sound half so naff in Spanish). Two or three times a week, she said. Doing what, exactly? Looking up works of art and emailing fellow devotees of the same. She said she was a student at Barcelona University. She and her friends regularly pop in, both to surf the net and to help with their studies. At least, that's what I think she said.

The rest of the clientele were also totally unlike the average UK internet café crowd. It all seemed part of a regular Friday night on the town, rather than being any sort of organised techie thing. I daresay they just stopped off here on the way to a bullfight. They weren't just youngsters, either. I must have seen at least a couple of grannies in there having a stab at it. All of which augurs well for the future of the system. In Spain, anyway. If only UK internet cafés were as appealing at this...

Anyway, if I keep up this typing, I bet the keyboard on this damn Compaq will start to disintegrate. So I'll sign off now, save to floppy, and maybe leave the laptop in the open where a non-discerning thief will nick it. At least I'll get some insurance money that way. ■

Homefront

Tim Nott bemoans the fact that, unlike cars and toasters, packaged software isn't covered by the Sale of Goods Act.

Tim Nott

If your new car or toaster develops a fault due to a design or manufacturing defect, you are entitled to have it put right. Irrespective of the terms of guarantee, the Sale Of Goods Act 1979 states that goods must be fit for the purpose for which they are sold.

Computer software has traditionally been free of this irksome burden of competence. Not only has it fallen outside the scope of the Act, but the restrictions stated in the licensing agreement tend to make the Citizen's Charter sound like a good deal.

Take, for example, the entirely mythical Megabloat 95. As your trembling fingers seize the envelope containing the disks, you read the small print which goes something like this: "By opening this packet, you abandon all hope of legal redress should the software turn out to be a load of elephant doody and fail to do the job it claims to do. We are, however, real nice guys and will replace the disks should they prove to be physically defective. However, should they be so defective that the little metal shutter is left behind in your 3.5in drive, thus rendering it inoperable, tough. We are not responsible for ANYTHING ELSE AT ALL except banking your cheque." I get around this by letting the cat rip open the envelope.

" 'By opening this packet, you abandon all hope of legal redress should the software turn out to be a load of elephant doody…' I get around this by letting the cat rip open the envelope"

A new development of this is the dialogue box that follows the installation routine, which goes something like: "I agree to the terms of the licence, however ridiculously restrictive these might be." Beneath this are two buttons, labelled "OK" and "Gosh, I now have 100Mb of software on my hard disk which I can't run." This is known as "a choice" — but only among lawyers. Again, my tip for the month is to get the cat to press the button. Some might deem it cruel to burden a poor, defenceless animal with all this responsibility, but I'd like to see Megabloat's lawyers getting it to testify.

Anyway, I was pleasantly surprised to read the outcome of a protracted law suit between St Alban's District Council and ICL, where the dissatisfied customers and little guys (St Alban's) claim to have won a significant victory over the giant Fujitsu-owned ICL. Normally, these historic landmarks in corporate litigation mean very little to you or me, but not in this case, as one implication of the appeal court's ruling was that packaged software should be covered by the Sale Of Goods Act 1979. In other words, it has to work and be fit for the purpose for which it is sold.

This is doubtless wonderful news. So why isn't my little heart bursting out of my anorak with joy? Experience has led me to believe that the consumer is expected to show a sporting tolerance towards bugs in the hope that they will be fixed by a free-ish update sometime in the foreseeable future, or in the next major release which will, of course, incorporate a whole new set of bugs — many in 32-bit versions.

In some cases (I won't name names, but I hope the relevant corporate ears are burning) the paying customers are expected to act as beta-testers. The problem is that it's very easy to shift the blame: "Ah, it doesn't print? That's because your printer driver's non-standard."

"But it works with all my other applications."

"In that case, are you using a third-party memory manager/screensaver/mousemat or disk utilities? In which case, you've only got yourself to blame."

In other words, the burden of proof will lie with the punter, and in all fairness one can't expect software writers to anticipate problems thrown up by others, provided they themselves stick by the rules. However, we could stop them getting their retaliation in first. Going back to cars and toasters, if the defect caused injury or damage by failing to stop when you apply the brake, or grilling not just the bread but your house as well, there would be much wailing and gnashing of lawyers. And this is where we could have them banged to rights.

How often have you spent hours wondering why, having installed Megabloat 95, some things don't work anymore? Control buttons have gone all woozy? "Call to undefined Dynalink" messages pop up? Your Winsock has apparently been lost in the wash? Yup, it seems that the designers of Megabloat have decided that the standard set of system files you have on your PC don't work too well with their brainchild. So, rather than modify the latter, they've replaced the former, and if that screws other things up, well, tough.

I suggest punitive damages for this sort of thing: for instance, the total cost of putting everything right in terms of time, support calls or whatever, plus a substantial award for the pain and distress.

Megabloat, you have been warned. ■

Straight Talking

After two failed launches Photo CD should be dead and buried, but the format may yet be good enough to rise from the ashes. Barry Fox comments.

Barry Fox

Kodak's Photo CD flopped the first time around because the launch strategy was ill-conceived. People in pubs want to take pictures out of their wallet and show them around, not plug a CD player into a TV set to show them on-screen.

Some professional photographers took up Photo CD as a convenient way to store and index images at a surprisingly low cost. This was because Kodak had launched Photo CD as a consumer product and had pegged the price accordingly.

Photo CD was initially of little use to the PC world because early ROM drives could only read the first "session" of images on the Write Once disc. Any images added later can only be read by a multisession drive which recognises the secondary index.

Modern drives are all multisession, so Photo CD is the ideal way to get high-quality photographic images into a PC. You shoot the pictures on film and then pay Kodak, or an authorised dealer, to use a high-quality scanner and ROM-burner to transfer the images onto a disc. The transferred images match the quality of the original film. So, although the PC display will use only a fraction of the image-quality potential, full film resolution is locked into the disc for future exploitation.

Surprisingly few PC users know what Photo CD can offer; a look back at the short, messy history of the format tells us why. We first heard about Photo CD in September 1990 when Sony, Fuji and others were promoting snapshot camera systems that used a floppy disk or solid-state memory store instead of film. These electronic cameras only captured TV quality, at best. Both Kodak and Philips had been working on a CD picture system with full photo resolution: Philips wanted it to be part of the CD-interactive system which the company was then preparing for launch; Kodak saw CD-imaging as a way of safeguarding the future of film. The two companies joined forces, announced the Photo CD concept, and invited the electronics and photographic industries to join the club.

Kodak promised a £300 player that would display Photo CD images on a conventional TV set. As a bonus, the player would play audio discs as well. The Transfer Station would cost dealers £60,000 but they would have an assured return on their investment because no consumer scanner could match the image transfer quality. A commercial launch was scheduled for 1992.

Bang on target, Photo CD hit the streets in the UK and the US in September 1992. But Philips was by then promoting CD-i. Philips' CD-i players would play Photo CDs, but Kodak's Photo CD players cost almost as much and wouldn't play CD-i discs.

Before long, Photo CD players were being flogged off as CD audio players for under £100, and now CD-i has failed, too; so as a consumer format, Photo CD is dead. Earlier this year, Dixons stopped selling CD-i players and software outlets such as Virgin have cleared out their stocks of discs.

Early attempts by Kodak to interest the PC market failed and it's not hard to see why. Even when users had multisession drives, Kodak's reader software (Photo CD Access and Photo Edge) was a nightmare to get working. Kodak soon lost interest, sub-contracting sales of reader software (at £34 a pop) to a company called Windowline. As this was never publicised, it's not surprising that sales were slow.

Last April, Kodak re-launched Photo CD, targeting it at the PC market. Don't wonder why you never heard about it — the event must go down in history as the most invisible promotional campaign of the last decade.

The good news is that there is no need to hunt around for the reader software. A free copy of Kodak Player, a Windows and Mac program that emulates the basic features of the now defunct consumer Photo CD player, comes free on the disc you receive when you pay for the transfer of images from negatives or slides.

The blank disc costs £4.99, and images cost 65p each to transfer, with a special deal of £13.99 to transfer all the images from a roll of film at the time of processing. Kodak Player displays images in small or full-screen mode, sequentially or in any order the user requires, and in a choice of two resolutions.

I found out about Kodak's new policy purely by chance, through talking to someone who had heard about it from somebody else. Even Kodak's Digital Imaging Division in the UK had not seen the announcement and Kodak's PR company had to spend a week tracking down a copy. Customer services co-ordinator, Carol Ayres, explained: "There was no press announcement of the re-launch. It only went to dealers. It is up to dealers to promote it to customers." This kind of muddled marketing policy sums up the whole sad story of Photo CD. Nevertheless, the system is so good that it may yet survive Kodak's mishandling. ■

Business Matters

Technology makes it possible to trace your caller's details before you have even picked up the phone. Brian Clegg wonders why it's not taking off.

Brian Clegg

I rang my telephone company with a query the other day. "What's your number?" they asked. It made me want to cry. It's as if British firms go out of their way not to give themselves an advantage. Could it possibly be that there's something in our genes that says it is not quite fair play to give yourself a better than average chance?

What am I going on about? Caller line ID. Between the first and second ring a little packet of information comes down the phone line containing the date, the time and the telephone number of the person calling. This could be enormously valuable, yet it seems as if there's a conspiracy to avoid making use of it. After all, if a telephone company doesn't know who's on the other end of a line, what chance do the rest of us have?

The difficulties with caller ID start when you try to get it. You have to pay extra to BT just to have the information pumped down the line, which is something of a cheek when you think about it. Then you need to interpret the data.

In a quick survey of phone shops, I found only two devices that recognised the caller ID information (both badged by BT) although more are on the way. The first simply notes the last 50 numbers that called — useful, but hardly brilliant. I don't deal with numbers, I deal with people. The second will tell you who is ringing but only if they are listed in its small memory — again, not ideal. For caller ID to work well, I want to be able to put a name against each call I receive, so next time I'll know who it is before I pick up the phone.

Time, then, to resort to the computer. But again, very few modems provide caller ID information. Anyway, let's assume a business can get hold of one, like the latest Hayes Optima, or has a compatible exchange. Now things are looking rosier. It's a simple matter to tie the information into a database. Before you pick up the phone, you can have a customer record up on your screen with all the relevant information. This is where the real business advantage comes in and why businesses should be queuing up to get caller ID, despite the barriers.

Hold on, though, this is fine for business, but what about the poor individual? Isn't this rather sinister? For instance, if you were always ringing a firm to complain, it wouldn't be technically difficult for them to make sure that your calls were always routed through to voicemail, rather than a real person.

On the other hand, there's plenty that's positive about the technology. No more tedious spelling out of your details. Even better, think of those hateful response systems where you have to listen to long messages explaining which button to press on your phone — and all at your expense. If the company you were ringing knew who you were, they could automatically route you to your favourite part of the company with the option to switch back to the menu if you wanted something different. It's trite, but it's true that you get a warm glow from a company that remembers you.

I once returned to a restaurant a year after the first visit. Once we were seated, I pointed out that it was the same table as the time before: "Yes," answered the proprietor "but you faced the other way round then." That sort of attention to detail makes a particular business more pleasant to deal with. There's something nice about a barman who can ask if you want your usual. Caller ID makes such recognition possible over the phone. Artificial? Yes. Yet somehow, if it's done properly, it can be impressive.

"Attention to detail makes a particular business more pleasant to deal with. There's something nice about a barman who can ask if you want your usual."

Sadly, even if you can get the technology, things don't always work. The biggest obstacle is generated by other companies. Generally, if a large company rings, you won't get caller ID, even if that company has it for internal calls. I asked a UK corporation why it didn't allow it.

Surprisingly, it's not a matter of policy, but compatibility. The BT-supplied FeatureNet system is incompatible with BT's own caller ID facility. But then, perhaps this isn't surprising from a company that seems to be going out of its way to make caller ID unusable.

Often, a new technology leads demand. You aren't quite sure what you can do with it until you've got it. With caller ID, the benefits are obvious; it's just getting your hands on it that's hard.

Perhaps it's time for a new version of an old joke: Ring Ring… *Who's there?*… Pay… *Pay who?*… Pay BT and they might tell you ... or not. ■

Letters

Send your letters to:

The Editor
Personal Computer World
VNU House
32-34 Broadwick Street
London W1A 2HG

or email
pcw@vnu.co.uk
or fax **0171 316 9313**

Drivers wanted
I am using Windows 95 and I cannot get Win95 drivers for the Logitech Scanman 256. I have accessed the US ftp site and apparently, if I send $20, they will send me a disk — not exactly your local corner store convenience.

Perhaps when reviewing products in your mag, you could publish the track record of companies with regard to updating drivers. I consider this to be a hidden cost of ownership and downright disloyal of Logitech to its customers.

If Logitech can't, or won't, offer adequate support for the mainstream operating system we should be told, so that when buying mainstream equipment we can avoid Logitech and its ilk.
Steven Johnston
via the internet

OS prejudice
Does Brian Clegg (*PCW* August) have something against people who use operating systems other than "boring" Microsoft ones?

He writes: "Flexibility is not one of their strengths…" when talking about DOS-only users, "…the saddest of all these creatures…" is someone who uses OS/2, and Unix users are very "laid back".

You are trying to promote coverage of other OSs in your magazine yet here is one of your columnists slagging off everything, from everyone except Microsoft. Get it together!
Richard Smith
Via the internet

Child's play
My eight-year-old daughter was happily playing with the "Toyshop" CD, supplied with the AST Advantage system I'd bought some weeks earlier, while I read the newspaper one evening. From out of a suspicious silence came a very quiet: "Daddy, where's Windows gone?" Leaping immediately to her side, I asked what she had been doing. "Oh, just looking with Explorer for something else to do..." came the reply. With the emergency boot disk to hand, investigation revealed no sign of Windows 95. Conclusion: she'd run Uninstall on it.

Now, I know that even 95 has to comply with its own rules on the provision of this feature, so I wasn't too fazed by this. All I had to do was re-install Windows from the CD that had come with the system. I had, after all, paid for a system complete with OS and assorted software, so no problem really.

However, some time later, after much delving into that CD (Windows 95 "Companion"), examination of AST's recovery floppy/CD combo, and modification of their batch file to prevent formatting of C:, I rang the helpline. It appeared to me that Setup.exe for 95 was the only thing missing from the CD so I asked where this might be. After horrified responses like "We cannot offer any support if you do that," the supervisor was called: "There is no way you can avoid a full format and re-installation of everything" said AST, without offering an alternative. "You should have kept backups."

I bit the bullet and ran the recovery program knowing I could get most things back. Altogether, I reckon it took about 16 hours!

Lessons to be learned? I've copied the Uninstall program onto a floppy, set up desktop icons for the children's applications and banned them from using anything else. Both AST and Microsoft need to re-consider their policies on what is pre-loaded as a Windows 95 system. The thought remains that I'm stuck with paying double for a full copy of 95 if I ever need to re-install it.
Allan Coaker
via the internet

Don't migrate — wait
Ben Tisdall and Tim Anderson write ("Where next for Windows?" *PCW* September) that NT is currently not a straightforward upgrade from Windows 95, and exhort all Win95 users therefore to "migrate as soon as it is feasible to avoid a painful conversion later."

However, Microsoft has stated on its Windows NT 4 web site that although there is a current problem with migration from Windows 95 to NT, it will address this at the next release

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(due after Windows 97, I believe). Furthermore, as Ben and Tim themselves observe, from 1998 Windows will have a common kernel based on NT.

This leads me to believe that Microsoft has no intention of leaving millions of Windows 95/97 users in the lurch. So it sounds to me like wholesale migration to NT now is the worst possible option for Windows 95 users.

Keep up the good work with *PCW,* the most well-written magazine on the market: a Rolls Royce among hordes of Suzuki Vitaras!

William Scott
via the internet

Excellent! Does this mean you like the new CD as well?

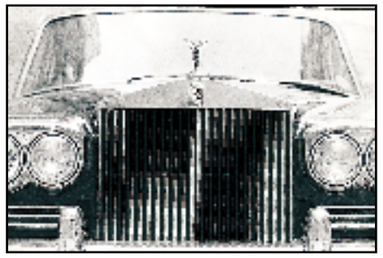
Never mind the technology, what about the content?

At last! Something in *PCW* that addresses the troublesome question of what does a business get out of using PCs (“Business Matters”, *PCW* October). However, I would add to the business area those public sector organisations which appear to be spending money on IT like there’s no tomorrow.

There is a lot that is excellent in *PCW,* but for me the gap in *PCW* is a lack of discussion about this sort of issue. Your columnist, Brian Clegg, is right about quality of presentation. In my own organisation it has improved no end. Tippex, messy stencils and Roneo machines have long been a thing of the past. Good-quality PC/laser printer-produced documents are now churned out by the thousand. Whether or not content has improved is another matter. Eye-catching fonts, true blacks, bright colours and well-designed graphs are no substitute for good ideas. As for the innovation to which Brian Clegg refers, organisational culture can and does stifle the potential for creativity that PCs could bring.

Your *Editorial* expresses the laudable aim of improving the design and presentation of your magazine, but please don’t forget the content. PCs are a remarkable piece of technology but they still don’t think, or have ideas or goals — people do. There is no evidence I am aware of that suggests the use of PCs necessarily means that people or organisations become more productive or creative because of them. Given the amount of time and money being invested in this technology we ought to be regularly asking why this should still be the case and what is the solution.

CJ Stevenson,
Bolton



The *PCW* Roller — not (see “Don’t migrate...”, p51

Fudged FrontPage

As a happy FrontPage user I just have to complain about your review of MS FrontPage (*PCW* October).

The reviewer talks about the “breathtaking arrogance” of Microsoft in assuming you will be using a web server with FrontPage extensions.

This is breathtaking ignorance on your part, as you clearly don’t realise that this is not a Microsoft product but a recently bought-in product (from a company called Vermeer), which is slowly being given the Microsoft corporate gloss. The FrontPage extensions are available free on Microsoft’s web site and support all the major web servers.

Later, in the Editor’s Choice section, you say that it “assumes” you will be using an MS web server. This is incorrect. Until a couple of months ago, support for the Microsoft Web server was, amazingly, conspicuous by its absence. FrontPage will work on any web server but can provide extra features on web servers which “know” about it. It’s not often I see such gross inaccuracies in *PCW*. Please make sure it doesn’t happen again.

Richard Borrie, Yor

We’ll do our best.

BT business

■ Having seen BT’s advert in the *Daily Telegraph* proclaiming its internet services, I telephoned the freephone number. The lady at the end of the line was polite and checked out my details with care. But when I admitted (?) that I didn’t own a modem, I was told that I wouldn’t be able to access the information I required, like pricing and facilities. These were “only available on DOS or CD-ROM” and “could not be accessed other than via a modem” (*sic*).

I can’t help feeling that BT is shooting itself in the foot. I appreciate that it is probably using non-technical personnel for telephone response, but surely it must have information which can be accessed by non-modem-owning Luddites like me. Ah well, back to pen and paper.

David Raison, Guildford

■ Further to Barry Fox’s recent articles (*Straight Talking*, *PCW* July and October), I believe he may have been a little too harsh in his criticism of the new BT internet service. I experienced no problems installing the BT internet software and have found the service to be excellent. What impressed me was the speed with which you are connected to the internet. I have never experienced any delays, despite dire warnings from some users of other systems.

As for the quality of BT’s help desk, anyone who has ever attempted to use the Microsoft help desk will be amazed by the fact that when you phone BT for help (which, for a newcomer, is probably inevitable at some time), the call is answered immediately by an expert able and willing to answer your questions clearly and completely.

On one occasion I installed some software which, without warning, deleted some of the entries in my configuration files relating to the BT service. The BT help desk immediately explained what I should do and within a few minutes the problem had been rectified.

Christine Phillips
via the internet

■ Telephone directories are always out of date, sometimes badly so. The given remedy was Directory Enquiries which used to be free; but the catch was that you could never get through during office hours. Now we have relatively easy access but at a stonking great premium.

When I heard about the BT phone disk, I thought it would prove to be the answer: all registered domestic and business phone numbers for the UK on CD-ROM (except Kingston-upon-Hull!). I looked forward to a Windows 95-compatible environment, rapid searches with wild-card facilities and perhaps the ability to dial automatically. After 900 enquiries I might break even!

A few weeks ago I stumped up £235 for the purchase of a BT phone disk (the latest June ’96 release) and discovered that I’d bought a lemon. Why? It is a DOS-based program and does not work properly in a Windows 95 “DOS prompt” environment because it cannot find the CD drive. The bodge recommended by the BT Helpline is to use Windows Explorer and launch from there. This is not very impressive technology considering how many use Windows 95. An upgrade is due next quarter but at £235 a time I expect better.

The search routine and display is positively antiquated — it looks like a dBase program from 20 years ago. Finding numbers can be difficult. For example, I tried to find the Marriott Hotel in Leeds, so I keyed in Marriott Hotel in the name field and Leeds in the location field — it didn’t exist! Even the Key Word facility didn’t help. Unbelievably, if you typed Leeds in the name field and

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Our new cover CD — the jury’s still out

■ Once again I step boldly into the twilight zone of steaming mists and fog that is your new CD-ROM format. With a glint in my eye, I search for he who had been promised me by the gods: a man like myself, another Explorer! I trek for days through tropical rain forests, deep ravines daring me to make one false step. Although weary and hungry, I march on in the knowledge that my effort will be rewarded.

After weeks alone in the jungle, having searched every nook and cranny and found nothing, I got desperate. There was only one thing left to do. I took a deep breath, closed my eyes and prepared myself for the trance of regression. As my mind swirled in the great toilet of time, I uttered the long forgotten mystic words: “dir msie*.*/s”. I sat shivering, my mind clearing now, waiting for a reply. Then from the darkness came the deep, rumbling voice of insanity: “File not found”. My misery was complete.

Tim Daplyn
via the internet

■ I like the new format of the cover CD’s layout, but I would like to see more full-motion video clips and basic freeware upgrades from the internet as it is much cheaper to copy off a CD than it is to download files. Also, I would like to ask if more DOS utilities could be on the CD as I have a 486 and a 286.

Anon
via CompuServe

■ Total crap!

Peter L Crosland
via the internet

■ That is gorgeous. Well done.

Nick Wilder
via the internet

■ Looks better and doesn’t have that stupid spinning idiot screen bit, so pretty good so far. Just sort out that Acrobat stuff (I’ve got it and I don’t want to re-install it).

Alexander Newman
via the internet

No problem… we have.

Leeds in the location field, then Hotel in the Key Word, it found it. Yet when I dialled 192, I got the number in seconds. Why? Because it is listed as Leeds Marriott Hotel. BT's Helpline Manager told me that this was because the 192 operators were specially trained and knew these things.

I next tried Wharfdale Hospital, Otley. No answer, even when using fuzzy search. You can find it if you type Hospital in the name section and Otley using the fuzzy facility. Surely, a search program should be more sophisticated than this? "Ah, you see" said the BT helpline manager, "all the data is encrypted to a very high specification and that makes searches difficult and they take up space."

I remained unconvinced. Have they not heard of a hard disk? Why they have to encrypt information that can be obtained by reading the phone book at home or in the library escapes me.

The BT phone disk is a shoddy product. It is over-priced, antiquated, inefficient and doesn't support autodialling. BT has an ideal opportunity to market something really helpful but so far it has blown it. Maybe we should continue with 192?

Chris Hawkes, Ipswich

BT's phone disk is a rip-off, but probably not for much longer. UK Info from Topware does the same job better for just £20. See Newsprint, page 39.

Plus and minus

Great new look. Michael Hewitt [*Sounding Off*] is making me laugh louder every month. I installed Windows 95 at the start of September, strangely hassle free (or was that because I had those patches, fixes and utilities which all those pioneers had to wait for?), but Michael was right; where the hell did my hard drive go? Ah yes, the Plus pack (as if you need ALL of the themes on the hard drive). All those programs that claim to be totally 95-compatible and can be removed by a single mouseclick, that then flash up the message "not everything will be removed from your hard drive".

I had to think back to all the games I didn't play any more, and 80Mb came back in a flash. It's a real shame that you still have the same needle-in-haystack hunting job to keep disk space free.

Kennethh@filmbox.demon.co.uk

Gadgets

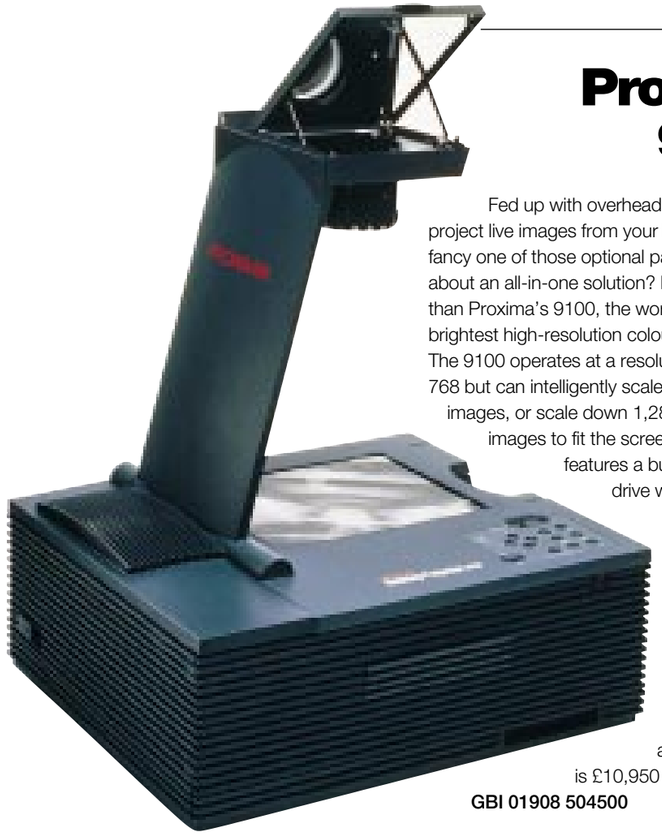
PCW Gadget Photography by David Whyte

Logitech WingMan Warrior

A joystick which occupies almost as much desk space as a keyboard must be something special, and Logitech's new WingMan Warrior doesn't disappoint. More than a single handful, it features not only a conventional stick control, but also a 360-degree optical spinner knob for the neglected palm. Particularly useful for Doom, the spinner makes the extremely handy circular strafe move a doddle — try doing this with a keyboard and you'll seriously tie your fingers up. The cost of winning all future death-match showdowns is £69.99 (incl. VAT).

Logi UK 01344 894300

Proxima 9100



Fed up with overhead slides? Want to project live images from your PC but don't fancy one of those optional panels? How about an all-in-one solution? Look no further than Proxima's 9100, the world's smallest and brightest high-resolution colour LCD projector. The 9100 operates at a resolution of 1,024 x 768 but can intelligently scale up 640 x 480 images, or scale down 1,280 x 1,024 images to fit the screen. It even features a built-in 3.5in floppy drive which can read and display Acrobat files and presentations without the need for a PC. The price for this level of performance and convenience is £10,950 (plus VAT).

GBI 01908 504500

Nintendo Transparent Gameboy

Yes, we know it's been out for ages, but we couldn't help ourselves. Following on from the Nintendo-packed madness of our previous issue, here's the classic Gameboy, but ooh-er, it's got see-through clothing! Yes, a transparent Gameboy is yours for £44.99 (incl. VAT), a mere fiver more than the original. Alternatively, you could wait a month longer and go for the forthcoming Gameboy Pocket. Fifty quid gets you a gadget smaller and lighter than the original, and in a far classier metallic finish.

THE Games 01703 653377

Microsoft Sidewinder Gamepad

While new-technology games consoles continue to evolve, an enormous number of computer companies are still developing and promoting the PC as the ultimate games machine. 3D graphics cards are all the rage and wavetable soundboards are the norm. Now Microsoft takes you one step closer to the games console experience, with a joypad games controller. The Sidewinder Gamepad, costing £39.99 (incl. VAT) and due on the streets by the end of October, boasts six buttons, two triggers, and the eight-way pad controller familiar to all console addicts. It's Windows 95 only, it can be reprogrammed, and you can even have up to four daisychained together — Nintendo, Sony and Sega, watch out!

Microsoft 0345 002000

Nikon CoolPIX 100

After coming up with several expensive professional digital cameras, Nikon is now targeting the personal market with two new models. One is a multi-function camera with built-in audio recording/playback and 2.5in colour LCD panel. The other, the CoolPIX 100, is uniquely based around a PC Card and is due out in November at a suggested retail price of £439 (plus VAT). The battery pack slides off the main unit to reveal a PC Card which slots straight into a PC for direct image transfer. It features 480 x 512 resolution, 42-image capacity (in normal mode), built-in flash, auto-exposure, self-timer, and macro close-up mode. It measures 60 x 152 x 33mm and weighs 160g without the battery.

Nikon UK 0800 230220

Sharp ZR-8000

Palmtop buyers who want to be different should take a look at the Sharp ZR-8000, the latest of a series sold outside the UK under the name Zaurus. It has similar organiser and comms facilities to the market-leading Psions but is slightly larger, so that some might find its keyboard more usable. It also boasts a backlit screen, which even the latest Psion 3c lacks (see *First Impressions,* page 64). But at £450 (plus VAT), it costs a lot more. Watch out for a full review in *PCW* next month.

Sharp 0161 205 2333

First Impressions

A first look at **brand new Psion palmtops** (p64 & 66) and the svelte **ThinkPad 560** (below). Check out the big screen in **Cinemania 97** and a wide range of music in **Music Central 97** (p88). There's fun for children and adults alike with the **Muppets** and Disney's **Toy Story** (p97), and the fastest CD-ROM drives yet screech to a halt on page 69.

Contents

Ratings

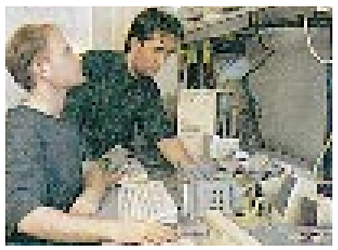
★★★★★ Buy while stocks last
★★★★ Great buy
★★★ Good buy
★★ There's a better buy somewhere
★ Buy it and weep

VNU European Labs

VNU Labs tests cover every kind of hardware and software. The tests are continually developed and enhanced to reflect developments.

Our tests closely simulate real-world use. For example, our suite of PC benchtests uses complete versions of industry-standard Windows 95 applications — currently Word, Excel, WordPerfect and FoxPro. We also run a graphics re-draw test using CorelDraw 6, and a Doom2 frame rate test which is a good indication of games performance.

Application tests are the backbone of all the VNU Labs system evaluations, but it's nearly impossible to pin an application result to a specific machine component. Only system-level tests (also known as low-level tests) can reliably tell the difference. VNU Labs' system-level test suite is called



Euromark. The tests, which are mainly Windows-based, are used to isolate specific components like hard disks, graphics cards and CD-ROM drives.

■ To make them easy to read at a glance, all graphs in *PCW* are drawn so that the bigger the bar, the better the result. Normally we'll also include the original data we worked from: for example, the time in minutes and seconds to print a page in a comparative test of printers.

IBM ThinkPad 560

Another waif on the slimline catwalk, the ThinkPad has class but lacks versatility.

The ThinkPad is among the most desirable and successful notebooks on the market, and the slimline 560 follows hot on the heels of a flotilla of slimline notebooks from the likes of Compaq, Digital and Acer.

It has been designed to fit into a document wallet, so at 22cm by 29cm it is slightly larger than a sheet of A4. It is only 3.3cm thick, which is not as thin as the Digital but still a skinny waif, and at 1.87kg it is extremely portable. The pay-off, though, is a lack of internal drives. The external floppy drive is attached via a cable to a dedicated floppy port and there is no CD-ROM drive. To run our tests we plugged in a Sony Discman PDR-250, which runs off an Adaptec SCSI-2 PC card. IBM can provide an external quad-speed drive for £295 (plus VAT) or a stereo CD for £465.91. If you need a CD-ROM drive and floppy with you at all times, this solution may not be ideal as the weight and size advantages of a slimline disappear as soon as you have to lug around extra peripherals. And your classy-looking notebook, with its subdued, pared-down lines, could end up resembling an electronic octopus.

Otherwise, the design is remarkably sensible, with a large wrist-rest for comfort and one of the best-organised and full-sized keyboards we have seen on a notebook, although there is no Windows 95 key. The keyboard does not suffer from the usual problems of being springy or spongey, but would rate well beside a desktop keyboard. True to IBM form, the pointing device is a nipple, which some may love and others may hate but which is nonetheless easily controlled.

The basic spec of the notebook we reviewed was fairly minimal. It has a Pentium 100 and an 810Mb hard disk but a measly 8Mb EDO RAM as standard, upgradable to 40Mb. P120 and P133 models are available, the hard disk can be upped to 1.08Gb, and the screen, an 11.3in DSTN on our review model, can be replaced by a 12.1in TFT. Windows 95 is loaded as standard, in line with IBM's decision to move away from OS/2 as the operating system of choice for its consumer PCs. We asked for the RAM to be upgraded to 16Mb, and anyone who is serious about running Win95 efficiently would be well advised to do likewise. We tested it with and without the RAM upgrade and with 8Mb the performance was poor.

The sound capability is simply 16-bit with SoundBlaster Pro support. You will need to attach external speakers to make the most of this facility, as there are no speakers, which yet again means carrying more equipment if you want to make presentations when out on the road.

The screen was the only let-down on the machine we reviewed. It is a DSTN and liable to bleeding, moiré and the general lack of clarity usually associated with this technology. It would have been interesting to compare it to a TFT version to see how that shaped up.

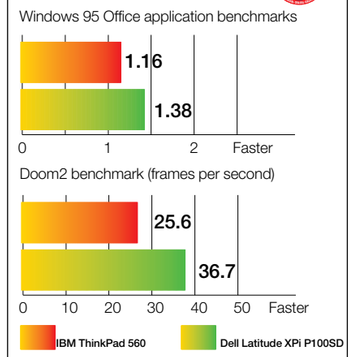
Performance results were reasonable but perhaps not what one might expect of an IBM. With 16Mb, the 560 gave a score comparable to the Compaq 4110, which is also a slimline.

The IBM 560 is an excellent notebook if all you want is a basic machine without any extra drives. Compared to many of the new slimlines, this one does not have the ease of adaptability: both the Compaq Armada 4000 series and the Digital Hi-Note Ultra II have bolt-on multimedia modules which contain CD-ROM drives, extra speakers and room for an extra battery. The 560 therefore falls down on versatility, but as a basic machine it is very well built and carefully thought out.

Adele Dyer

The ThinkPad 560: Slim, sleek and elegant, but a little lacking in hardware features

Performance Results



IBM's ThinkPad 560 compared with Dell's Latitiude XPi P100SD. The IBM was significantly slower than the similarly-spec'd Dell, winner of October's group test, but was comparable in performance to the Compaq 4100, another slimline notebook of the same spec.

PCW Summary

IBM ThinkPad 560

Price £2419.59 (plus VAT) with an extra 8Mb RAM
Contact IBM 0345 727272
Good Points Lightweight, well-built.
Bad Points No internal floppy or CD-ROM drive.
Conclusion A good basic notebook.
★★★★

p64 ➢

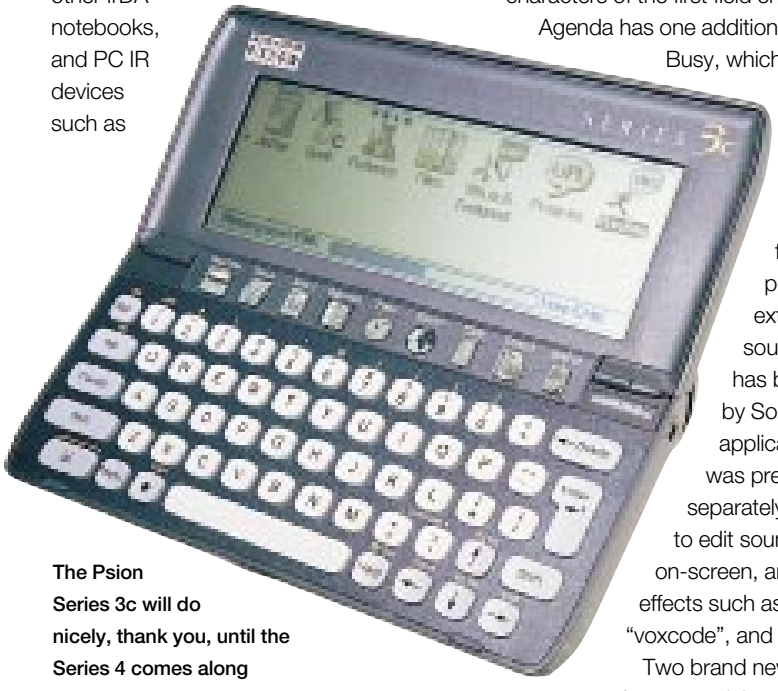
Hardware

Psion Series 3c

From 3a to 3c, with a few useful new features in between. A happy addition to the Psion family.

If you've been waiting patiently for Psion's much-discussed ARM-powered Series 4, you'll have to keep waiting. In the meantime, the 3c, launched last month, adds a few new features such as infra-red comms, a standard serial port, and one or two software tweaks. Psion apparently called the 3a's successor the 3c (and not 3b) partly to emphasise the machine's new communications capabilities, and partly because "b" has connotations of second-rate, or not-quite ready (like B-movies, or beta software).

Physical dimensions and styling remain unchanged, apart from a new rubberised coating replacing the Bakelite-style grained plastic finish. Starting with the infra-red port, it's primarily envisaged as a means to communicate between one Psion and another, and not between Psion and PC. The process of transferring data is straightforward, and fast (115Kbps) if you're used to the old 19.2Kbps "soap on a rope" 3-Link. Psion has no immediate plans to launch its own IR PC link, although the IrDA software drivers will be made available to developers. That should allow owners of other IrDA notebooks, and PC IR devices such as Extended Systems' JetEye, to communicate cordlessly. Apparently, the Series 3c already includes support for IR printers, and will be available as a software add-in for the Siena.



The Psion Series 3c will do nicely, thank you, until the Series 4 comes along

The 3a's proprietary serial port has been replaced by a standard RS-232 using a miniature 13-pin connector, located above the left-hand SSD drawer. This is also rated at 115Kbps, although you can only transfer data at speeds up to 57,600bps (still three times as fast as the 3a). Unlike the 3-Link, the new cable doesn't come with any software "built-in". There's a new version of PsiWin available, for 3c and Siena models.

Still on comms, there's little change to the terminal emulation application other than the long-overdue inclusion of ZModem file transfer support. And, an imminent new version of PsiMail, PsiMail Internet, will include internet mail as well as a graphical web browser and a trial internet account.

Changes to the standard built-in applications are few. You can now sort database entries by one or multiple fields and display the results in the form view, or a new list view which allows you to locate records by simply typing the first few characters of the first field entry.

Agenda has one additional view, called Busy, which gives a graphical display of your timed Agenda entries over a four-week period. The extremely spartan sound recorder has been replaced by SoundMaster, an application which was previously sold separately. It allows you to edit sounds graphically on-screen, and add special effects such as echo, "voxcode", and vibrato.

Two brand new applications are Jotter, a quick and simple notepad, and a rather good file manager, "Files", which gives you a split-screen display of your files and directories.

The 3c's 2Mb of ROM now includes OVAL. That's Psion's "Visual-Basic-compatible" development environment, which Psion has been beta-testing over the past year, using its Workabout handhelds. Although support is built into the 3c, all development still takes place on the PC. There's no change to OPL, apart from a couple of keywords to accommodate the new hardware features.

An updated version of Psion's 3-Fax modem is available. It's 14,400bps which is a lot faster than the 2,400bps of the previous 3-Fax, but anyone who does start to use the 3c for surfing the web will find it sluggish compared to the current standard V.34 modems. If you already have a PC-Card modem, there's an adaptor available which provides space for the card plus four AA cells, and connects to the 3c's serial port. It's interesting to note that Psion still quotes the poor power consumption of PC-Card devices compared to its own SSD standard as a reason not to include the industry-standard slots in Psion palmtops.

A curious omission in the 3c is backlighting; curious because all models sold in the US include that feature as standard. It seems Psion believed UK buyers wouldn't be prepared to pay an increased price for it. However, the fact that Sharp's latest models do come with backlighting may sway some buyers making feature-for-feature comparisons.

Mick Andon

PCW Summary

Psion Series 3c

Price £339.95 (1Mb) or £399.95 (2Mb) (both incl. VAT)
Contact Psion 0990 143050
Good Points Sensible hardware and software updates, and an already excellent suite of applications.
Bad Points Rubberised finish may show up greasy fingermarks.
Conclusion Still the most serious pocket computer you can buy.
★★★★

p66 ➢

Hardware

Psion Siena

Smaller and lighter than the 3c, and the handheld Psion hopes will attract new converts.

Psion handhelds have traditionally been aimed at the more serious user, but with the Siena, the company hopes to lure existing users of electronic databanks or paper-based organisers who aren't prepared to fork out three hundred pounds for a full-blown palmtop.

At about half the price of the equivalent 3c, there are inevitable compromises. The most obvious of these is the screen, which is half the width and half the horizontal resolution (240 x 160). And you won't find any SSD slots or digital sound recording. Otherwise, this is very much a Psion, with all the familiar applications intact: spreadsheet, database, word processor, and even the OPL programming language.

The Siena is significantly smaller and lighter than the 3c, weighing just 183gm including batteries. It's compact enough to fit into any shirt pocket. The styling is quite different, too. A button on the front of its sculpted rubberised casing releases the lid, upon which a small flap also pops up to expose the miniature RS-232 port and IrDA infra-red transceiver. Two AAA cells are located under here, which will power the Siena for around 40 to 50 hours.

Under the lid, the half-width screen frees up enough space for a small number pad on the right-hand side. This is also where you'll find on/off buttons, and buttons for infra-red send and receive.

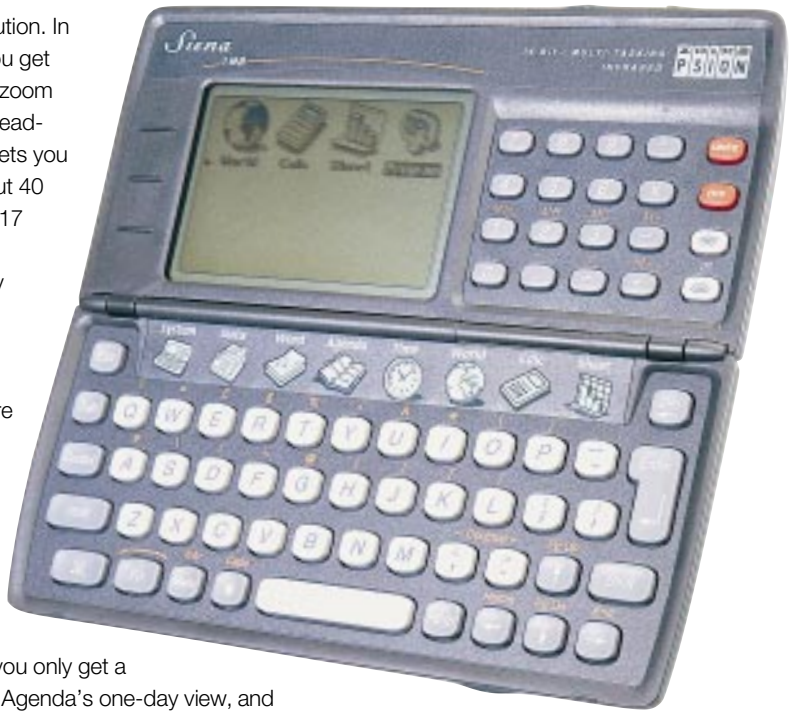
Below the screen there's the same familiar Series 3 layout, including eight-button touch-sensitive application strip. Unlike the 3c, these use the same rubber membrane as the keyboard. There are just four rows of keys in the main alphanumeric section, rather than five, since the number keys have been moved to the lid. The arrangement works well, and the slightly smaller keys don't really hinder fast typing. I did find the Siena's keyboard significantly less positive than the 3a or 3c, and since most of the weight and bulk is in the lid, typing is best done on a flat surface.

The smaller screen area may seem cramped to existing 3a users, but most applications suffer little from the Siena's reduced resolution. In most cases you get three levels of zoom (four in the spreadsheet), which lets you see up to about 40 characters by 17 lines. That compares very well with other organisers.

The built-in applications are fully compatible with those on the 3c, although the display may vary slightly. For example, you only get a single-page in Agenda's one-day view, and there's no year view. The spreadsheet is identical, although inputting figures is easier thanks to the numeric keypad. Applications also include the same enhancements as the 3c's, such as database list view and sorting, and Agenda's "busy" view. You can add an entry code to each Agenda entry, marking it as private, open, or restricted, useful when you are using Agenda in conjunction with PC-based PIMs in a groupworking environment.

Other applications include Time, with four alarms; and World, which gives information like dialing codes and sun rise/set times for most major cities around the world. Siena comes with 1Mb of ROM, compared to the 3c's 2Mb, so you won't find a spell-checker/thesaurus, file manager, or card game. This still leaves far more than you would expect in a machine in this class.

In addition to the on-screen, context-sensitive help, both the 3c and the Siena have "tips" which appear whenever you switch the machine on. Once you're familiar with the machine, you can disable this feature. The Siena also comes with a clear, 145-page manual written for non-technical users, complete with plenty of illustrations, glossary, and comprehensive index.



Quite a handful: The Siena offers superb features and performance in an affordable handheld

Since there's no SSD support you'd be expected to back up your data onto your PC, using a new version of PsiWin and the RS-232 cable link. Here, the maximum speed of data transfer is 19,200bps (compared to the 3c's faster 57,600bps). Given that the maximum internal memory is 1Mb, and there is no additional on-board storage, that should still prove fast enough for most users. An optional external SSD drive will be available.

Mick Andon

PCW Summary

Psion Siena

Price £169.95 (512Kb) or £229.95 (1Mb) (both incl. VAT)
Contact Psion 0990 143050
Good Points Excellent built-in software. Compatibility with Series 3c.
Bad Points Keyboard responsiveness.
Conclusion There's little to match it in terms of features and performance, for under £200.
★★★★

p69 ➢

Hardware

Pioneer 10x drives

The fastest CD-ROM drives on the market.

Let's face it: the inevitable jump in CD-ROM speeds is tiringly predictable. Single to double, to quad, and then just to fool us for a second, six-speed, before settling back to the doubling game with eight-speed.

"What next?" I hear you cry with an unconvincing attempt at enthusiasm. Well, Pioneer has released the replacements for its ageing quad-speed drives. To temporarily fend off the competition, the company has plumped for ten-speed and offered this new level of excitement in both SCSI and ATAPI (IDE) flavours.

But these drives can also operate exclusively in CAV (constant angular velocity) mode, rather than the usual CLV (constant linear velocity) mode. And it doesn't stop there, thrill-seekers: the new ten-speeds boast a standard mixed mode which operates in CAV mode for the first ten percent or so of the disc, then switches back to CLV mode for the rest. But why?

Then again, why go for a faster CD-ROM drive in the first place? One confirmed benefit is higher sustained data transfer rates. But the faster they operate, the greater the strain on your processor: the eight-speed ATAPI drives we tested last August took a crippling 30 percent of your processor's resources. The only exceptions were SCSI drives connected to pricey bus-mastering SCSI cards.

Apart from the few times you install software, there's little day-to-day benefit from high sustained data transfer (it is ultimately a marketing numbers game). We want faster access times, but this is tricky.

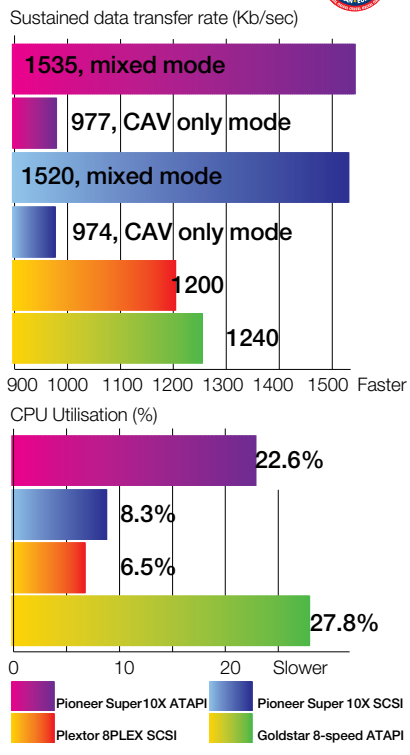
Back to Pioneer's modes. CLV varies the speed of rotation to keep a constant data transfer — the disc spins more quickly when accessing the inner tracks. CAV spins the disc at the same rotational speed throughout and improves access times on CAV-formatted media, such as certain Laserdiscs. Unfortunately, all CDs are formatted in CLV, so any access benefits of CAV mode are lost. Worse, sustained data transfer dropped by 30 percent overall in Pioneer's CAV-only mode.

CAV mode uses less power and may be beneficial in some portable situations. The slower spin speed also results in potentially less disc wobble with fewer required error corrections. This apart, the benefits of the CAV-only mode are minimal.

The mixed-mode benefits from the stability of using CAV mode on the inner tracks but does not result in amazing performance gains. On the plus side, both ten-speeds sustained the claimed 1,500Kb/sec, making them the fastest CD-ROM drives we've tested — this month. At around 22 percent, the CPU hit on the ten-speed ATAPI drive was high, but lower than the eight-speed ATAPI drives previously tested. SCSI was the ultimate winner, boasting a mere eight percent CPU hit. But remember: 12 speeds are poised for launch.

Gordon Laing

Performance Results



Pioneer's 10-speed SCSI and ATAPI CD-ROM drives compared with Plextor's 8-speed SCSI and Goldstar's 8-speed ATAPI drives. Notice the lower sustained data transfer rates in Pioneer's CAV-only mode, and the undesirably high CPU hit of ATAPI CD drives.

PCW Summary

Pioneer ten-speed CD-ROM drives

Price ATAPI £199 (plus VAT). SCSI £250 (plus VAT)

Contact Pioneer 01753 789722

Good Points Highest transfer rate yet.

Bad Points Hard to get too excited.

Conclusion The fastest CD-ROM drives so far.

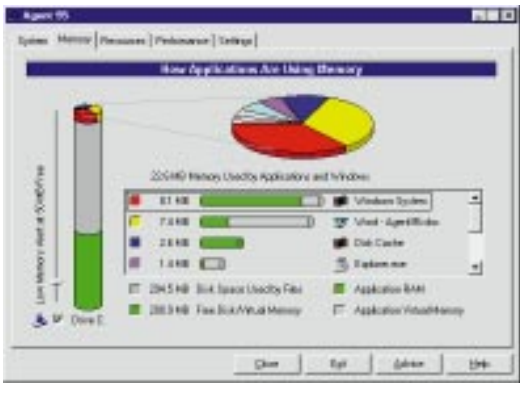
★★★★

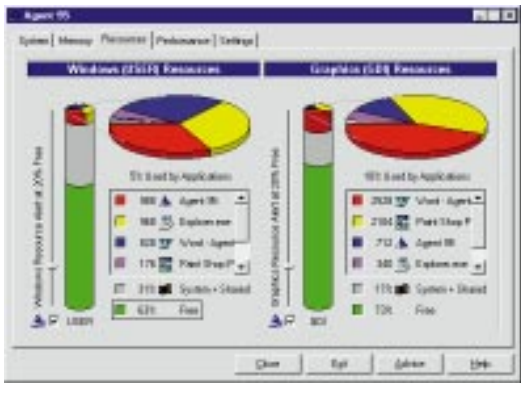
Software

Connectix Agent 95

This is handy to have around — it keeps an eye on your memory and resources.

Agent 95, in the words of the blurb, is a "system enhancement for Windows 95 that provides real-time analysis of memory and resources, improves performance through dynamic RAM compression, and provides alerts and advice to maximise overall performance and productivity." It comes on one floppy disk and politely installs its system files to its own directory. As it needs a minimum of 8Mb of RAM, with 16Mb recommended, this is clearly not being marketed as a miracle cure for low-memory PCs.





Above Thanks for the memory — and what is using it all
Right Resource usage shouldn't be a problem with Windows 95

Wafting the mouse pointer over the icon in the Taskbar system tray provides a snap report of memory, normally: "Agent 95 says A-OK". Clicking opens the control centre, which is tabbed into five pages. "System" reports the processor and BIOS types, total RAM and free space on each drive, with shortcut buttons to Windows' Device Manager and Network settings. This is nothing you can't find elsewhere but it's handy to have it all in the same place.

The Memory tab is rather more informative, offering a bar chart and list views of how both physical RAM and virtual memory are being used by each application running. This is an eye-opener: with just Word and Agent 95 running, the 16Mb test PC was already heavily into virtual memory, using a total of 22Mb, with Windows itself taking up 8Mb. The Resources tab shows a similar readout for the GDI and User heaps.

The Performance tab shows a bar chart spanning the past ten minutes, showing the proportion of time Windows spends swapping data in and out of virtual memory as opposed to actually working. These last three pages have adjustable "alert" levels and when these are reached, the Taskbar icon turns yellow and the pop-up message issues a suitable warning.

Further details and advice are available from the main window. However, the default disk space alert level (ten percent of the total) may not be ideal for all users and the help file offers no further information. The final Settings page reveals the proactive side to Agent 95 with the option to "Enable Compression". This, it is claimed, enhances performance by compressing data in physical RAM rather than swapping it out to disk.

Having used Agent 95 for more than two weeks, it became clear that under my normal working habits, memory and resources weren't an issue. So, to give Agent 95 a chance to show its mettle, I reduced the available swapfile space to half the recommended amount by filling up the disk, and loaded Word, Excel, Corel Draw and Adobe Photoshop, all with a selection of hefty files.

Agent 95 warned that swap space was running low and advised me to close some applications or clear space on the hard disk. With compression enabled, the Performance Meter showed an improvement, never dropping below the 50 percent alert level when switching applications. Stopwatch testing wasn't the same: swapping from Photoshop to Excel was twice as quick but the reverse was twice as slow.

The majority of Windows 95 users will never hit the resource limit and since Agent 95 itself recommends a minimum of 16Mb RAM, this should be sufficient for normal work. Power users manipulating large bitmaps or data sets will be well aware of the need for as much real RAM as possible. The RAM compression benefits remain, to this reviewer at least, inconclusive.

This leaves just two benefits. One is the sheer educational value of knowing what each application is using but the die-hard curious might like to know more: a breakdown of the 8Mb that Windows takes, for instance. The other is the swapfile space alert. Unlike Windows 3.1, which maintained a fixed size, Windows 95 adjusts dynamically, so it's possible to cramp its style on a crowded disk. Useful though the alert may be, the Windows help system has a comprehensive memory troubleshooting section and it is possible to set a minimum size for the swapfile. For the more ambitious, the Windows System Monitor shows everything about memory you could want to know and these, like the common-sense advice "don't cram your hard disk", come free.

Tim Nott

PCW Summary

Connectix Agent 96

Price £55.95 (plus VAT)

Contact Connectix 0171 622 3355

Good Points Straightforward and non-technical breakdown of memory usage.

Bad Points Doesn't offer significant performance benefits.

Conclusion A comfort, rather than a necessity.

★★

p72 ➢

Hardware

Matrox Mystique

This graphics card is designed for home use. It's especially impressive with games.

The Mystique, Matrox's new 64-bit fully 3D-capable PCI graphics card, is aimed squarely at the home user. It is based on the MGA-1064SG chip and makes use of the new Synchronous Graphics RAM (SGRAM).

The Mystique's spec, while not extraordinary, is more than enough for the average home user. The standard card comes with 2Mb of SGRAM (upgradeable to 4Mb) and a 170MHz RAMDAC. This allows for a vertical refresh rate of 60 to 160Hz at 800 x 600 resolution in up to 32-bit colour, or 60 to 120Hz at 1,024 x 768 resolution in 16-bit colour. If you have a monitor larger than 17in you can run at 1,280 x 1,028 up to 75Hz or an extra-fine 1,600 x 1,200 in 4-bit colour at 65Hz.

On the 3D side, the Mystique appears to hold its own. Unlike the Millennium, the Mystique has full 3D capabilities encompassing 3D texture mapping and transparency, lighting effects and Gourad shading all built in to the hardware. There's also the expected Z and double-buffering which allow for, according to Matrox, 25 million Texels/second fill rate (Texels/sec: fully-textured, shaded, polygons per second). Unfortunately, the area of 3D graphics, particularly the games market, is only now coming into its own so there's no real test that our VNU Labs could apply to see how the card compares.

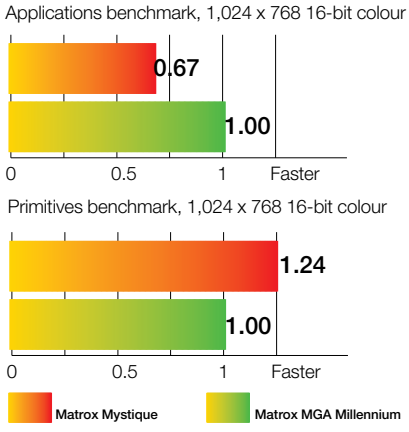
However, in my opinion, the 3D capabilities of the Mystique do impress. Matrox has bundled three games, including Scorched Earth, Mech Warrior II and Destruction Derby (all specifically ported to the Mystique) that provide that "out of the box experience" that buyers now expect. When I tried Scorched Earth, I found the rendering to be in real time. There were no out-of-sync images or sound and as I moved along, the images were drawn in a fluid manner. The Mystique didn't give any "Hey, where did that mountain come from!" surprises. The only criticism I could launch against the Mystique is that there were some artefacts and slight line tears in some parts of the games, but these were slight and didn't detract from the image.

CompCore's Softpeg is included, for playing MPEG movies, and there's a Direct 3D plug-in to allow other 3D games using the Direct 3D API to play on the card. This is important, but not special to the Mystique, because by the time Christmas rolls around there will be approximately 40 3D games using the Direct 3D API and all should be capable of being used on the Mystique. Matrox has also improved its drivers and display utilities. You can adjust the monitor refresh rate, gamma correction and virtual desktops more easily than previously (with the Millennium).

In terms of its 2D Windows performance, it comes up a bit short when compared with its elder sibling, the Millennium. It managed to outperform the benchmark Millennium at 1,024 x 768 in 16-bit colour on the graphics primitive tests but overall it wasn't as fast. This isn't necessarily a bad thing, considering that the Mystique is being released with full 3D capability and comes with a load of extra software and games.

Dylan Armbrust

Performance Results



The new Matrox Mystique compared with the classic Matrox MGA Millenium. The Mystique compares well, but shows its weakness in the applications test. It excels in primitives — precisely where it's supposed to, especially in the games field.

PCW Summary

Matrox Mystique

Price £120 (plus VAT)
Contact Matrox 01793 441144
Good Points Affordable, with good 3D graphics for games.
Bad Points Underperforms on 2D Windows graphics.

Conclusion A good card for the family PC: games for the kids, Windows apps for mum and dad.

★★★★

p74 ➢

Hardware

Iomega Ditto 2GB

Iomega's second stab at the mass market with a backup drive for home or small business.

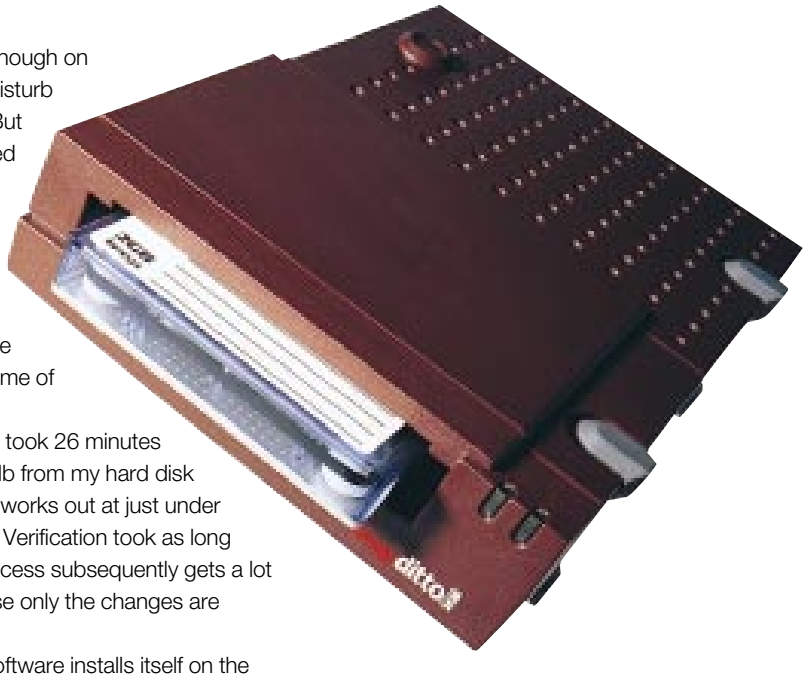
Recent virus scares have served as a reminder of the need for regular backups. A reminder is necessary as fewer than three in ten users back up their data, and the proportion could be even lower in homes and small businesses, because suitable systems tend to be expensive.

Iomega spotted a potential mass market here which it targeted last year with its EZ800 tape drive and simple backup software, which together can be bought for as little as £80.

However, the tapes are pricey. Ditto uses 400Mb (800Mb compressed). Travan tapes cost £26 each. One is not enough to back up the latest entry-level drives of 1Gb and above. Iomega reckoned tapes for a higher-capacity Travan drive would be priced out of the mass market, largely, it claims, because of the greed of tape maker 3M.

So, for its follow-up Ditto2GB drive, it uses a non-standard tape cartridge that costs £15 and holds 2Gb compressed, bringing backup costs to below 1p per Mb. The drive will read but not write QIC and TR1-3 tapes. An internal Ditto2GB, which daisy-chains from your floppy drive, costs £125 (incl VAT). We looked at the £175 external parallel port version.

This looks exactly like the EZ800 with its dark maroon case, twin status lights and twin parallel connectors (one linking to the PC, the other a printer pass-through). It sounds much the same, muttering and burping loud enough on occasions to disturb the sensitive. But you do not need to be around to hear it because the CD-based toolset allows you to schedule backups at a time of your choice.



The system took 26 minutes to dump 204Mb from my hard disk to tape, which works out at just under 8Mb a minute. Verification took as long again. This process subsequently gets a lot shorter because only the changes are backed up.

The Ditto software installs itself on the Windows 95 taskbar, allowing you to update your backup at the click of a button while you continue to work at the PC. This arrangement is not as happy as it sounds because the module is easily launched by mistake. Moreover, naïve users, for whom this instant reassurance is presumably designed, are likely to be baffled and alarmed by a series of messages about obscure Windows files that cannot be backed up because they are in use.

A promised feature of the new Ditto, that we would be able to address it like a standard disk drive, was not available on the review system. Iomega says it will be included later this month.

Our only other caveat is that the new tapes and their very high data density, have yet to prove themselves in the field.

Clive Akass

PCW Summary

Iomega Ditto 2GB

Price £175 external, £125 internal (incl. VAT)

Contact Iomega 0800 898563

Good Points A cheap and cheerful fail-safe.

Bad Points Software strives too hard for simplicity.

Conclusion You, too, can afford to back up your disk.

★★★★

p76 ➢

Software

Sage Instant Accounting

Get everything to add up with this easy-to-use, entry-level business accounting software.

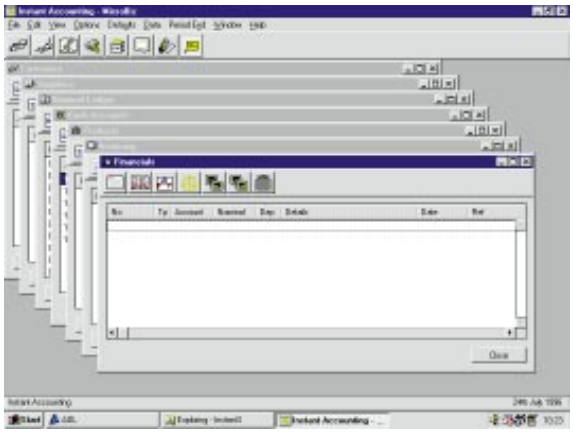
Easy to use with features for the small business, Sage's entry-level business accounting software, Instant Accounting, has now reached version 3.01. It offers new and enhanced features for users upgrading from version two or the obsolescent Moneywise. It is also a contender for those computerising their accounts for the first time. It's compatible, and shares menu format and icons with, Sage's Sterling software to which you can upgrade when you're ready for its extra facilities like stock control or order processing.

Instant is a full three-ledger system: nominal, sales and purchase. It has cash and credit trading facilities including credit cards, cash and accrual VAT accounting, financial and management reports. Despite having a full audit trail, Instant 3 accommodates the non-accountants who may well make up its main market. It allows limited correction of mistakes, including reversing mis-postings without resorting to double-entry ledger transfers.

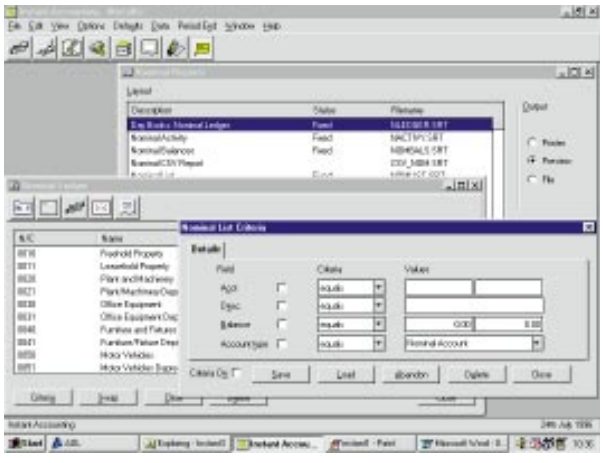
The audit trail, which is a complete listing of all your transaction activities, is favoured by accountants and auditors because it's supposed to help prove that you haven't cooked the books. You can periodically "clear down" Instant's audit trail, removing transactions that have been reconciled with your bank, reconciled for VAT and, where appropriate, fully paid, although you can preserve your reputation for probity by first printing out a copy. Instant Accounting claims to be able to store up to two billion transactions in the audit trail, given enough computer memory and disk space, so you need never clear down transactions from the audit trail if you don't want to.

Organisations where accounts are maintained by clerical staff often prefer to prepare invoices, credit notes and statements in batches for checking, whereas smaller companies may prefer to post items immediately. This product lets you do either.

You can enter invoices you have produced manually and already sent to your customers. Invoices can be product or service-based, using either standard templates or your own design. There are impressive document-customising facilities, allowing you to produce invoices, reports and letters to your own layout on plain paper or to use pre-printed stationery. You can get personalised and pre-printed stationery from Sage, too.



Left Instant Accounting's data entry is accessed via the tool bar or the curiously-named Options menu item



Below Instant lets you interrogate your data using criteria of your own choosing

You also get the fashionable and useful "drill down" facility, implemented in transaction activity reports for customers, suppliers, nominal or control accounts, in which you can analyse transactions into the individual items that make up the transaction by double-clicking on a line of the report. Other small but thoughtful touches include a calculator button on some of the numeric data-entry boxes, and a calendar button on text boxes where you need to enter a date. Equally useful if you're not an accountant are Instant's Wizards, which hold your hand through awkward, if little-used, procedures like transferring money from one bank, cash or credit card account to another.

Instant's reporting can be quite extensively customised for a product in this price range. You can decide which periods will be used in reports, using either calendar months or number of days. You can include transactions dated after the report date and automatically group together consecutive transactions of the same type on your statements: for instance, those that share the same date or reference.

Transactions can be assigned to up to 999 different departments and you get 999 different product categories for analysis. You can select report data, using self-defined criteria, for areas like customers, suppliers, nominal accounts and product records, as well as invoices. You can set up and save frequently-used criteria for use at a later date, too.

James Taylor

PCW Summary

Sage Instant Accounting

Price £149 (incl. VAT)

Contact Sage 0191 255 3000

Good Points Useful combination of traditional accounting controls with ease of use.

Bad Points Not as intuitive as it thinks it is. No demonstration data on which to cut your teeth.

Conclusion Becoming a classic with a good range of features for the smaller business.

★★★★

p78 ➢

Hardware

Mesh Elite Ultima 133

Beauty's only skin deep: the boxy shell of this Mesh hides a great-value system.

PCs aren't getting cheaper, but in terms of value you've never had it so good. Competition and falling component prices mean that today's PCs come ready-equipped with many accessories once regarded as extras.

The Mesh Elite Ultima 133 is a prime example. From the outside it doesn't look too exciting, housed in one of Mesh's trademark boxy desktop cases with speaker-like grilles on either side, but there's nothing behind these grilles. The real speakers are external Altec Lansing ACS5X units powered by a DC transformer.

Inside the case is a Pentium 133MHz processor supported by 512Kb of burst mode cache and 16Mb of EDO RAM in the form of two 8Mb SIMMs, leaving two empty sockets for further expansion. All these components are mounted on an ASUS-branded motherboard employing Intel's highly efficient HX430 PCI chipset.

Naturally, there's a fairly capacious hard disk, an efficient 1.2Gb Quantum Fireball which is a popular choice in this class of machine. Further mass storage is provided by an eight-speed Toshiba 5602B CD-ROM drive, providing full multimedia in conjunction with the Vibra 16 sound card. Graphics support is courtesy of a 2Mb ATI 3D Xpression (Rage) card which drives an ADI MicroScan 4V monitor.

This is the sort of decent spec you'd expect for the price, but Mesh has added two enhancements: a Pace Microlin V.34 fax modem for data communications at speeds up to 28,800bps, and an additional ATI graphics module linked to the display card's feature connector, providing TV viewing, video capture and Teletext facilities.

There is software pre-installed to control the TV card, video capture facility and the modem. Lotus SmartSuite 96, a 32-bit suite of office applications, provides key productivity tools, and to make best use of the 3D graphics card there are three games: Assault Rigs, Mech Warrior II and Actua Soccer. ATI has worked with Microsoft to develop an API for its graphics card. Further 3D games, taking advantage of its features, are said to be in the pipeline. Our Doom frame-rate benchmark test returned a figure that would be respectable for a 166MHz Pentium, so the ATI graphics card clearly does the business with DOS games. Windows performance, according to our lab tests, is equal to the standard of other recently-tested 133MHz machines.

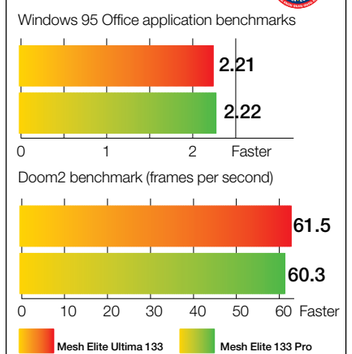
However good the graphics card it relies on a decent monitor, and the 15in ADI MicroScan 4V is no slouch. It's capable of displaying 1,024 x 768 non-interlaced at up to 76Hz and has a comprehensive set of geometry controls controlled by three buttons and a row of LEDs just under the screen. The picture is stable, focused and well-saturated with colour. There's minimal distortion at the screen edges, and the range of brightness and contrast produces a bright, clear image even in adverse lighting conditions.

The video features of this PC are a strong selling point and as far as we can tell, given the poor reception and interference from other kit in our VNU Labs, the ATI hardware produces pictures of the best quality one could expect from TV on a computer. The software supplied to control the TV and video card is very flexible. Even in full-screen mode there's a row of buttons at the bottom of the display providing full control over picture quality, channel selection and grabbing. In Teletext mode, you're provided with all the features found on the latest full-function hand controllers.

Unless you want to add secondary storage devices and a network card, this PC contains everything you need for serious work or leisure. If you need to expand it, there are three free drive bays with external access. All the ISA expansion slots are occupied and only two of the PCI slots are usable.

Paul Wardley

Performance Results



We compared the new Mesh Elite Ultima 133 with the Mesh Elite 133 Professional, which won Editor's Choice in *PCW* August 1996. Three months later you get the same performance, along with V.34 modem, TV card, better CD drive and graphics card, and save £300.

PCW Summary

Mesh Elite Ultima 133

Price £1,195 (plus VAT)

Contact Mesh 0181 452 1111

Good Points Good build quality. Extensive range of supporting software and documentation.

Bad Points No free ISA expansion slots.

Conclusion Good value and configuration, but poor expansion options.

★★★★

Hardware

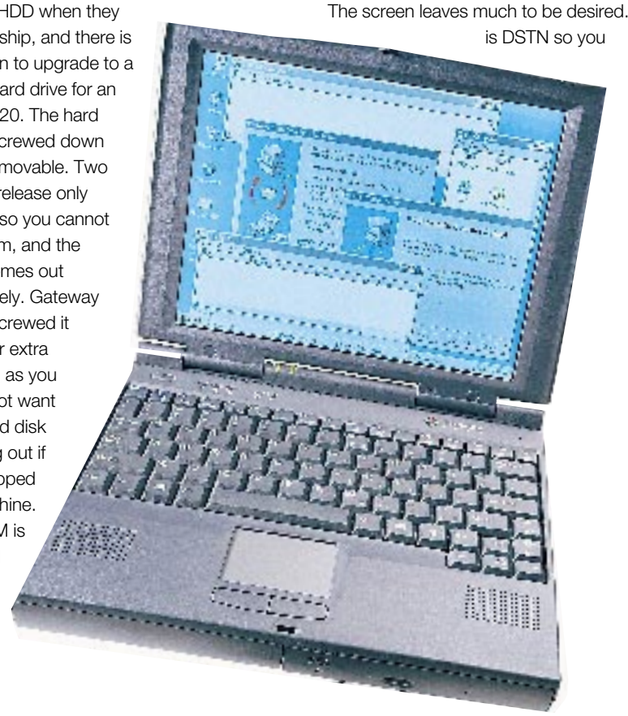
Gateway Solo 2100

This notebook outperformed others of the genre and comes in at a lower price.

Gateway is not known for its notebooks. It launched its first generation of Solos last year, but regarded notebooks as a sideline rather than a main earner. Since then, the notebook market has taken off and Gateway is pushing for a larger slice of an ever-rising cake.

True to form, however, it is not making its own equipment, but rather buying in a standard chassis and rebadging the finished deal. As rebadges go, this one isn't bad. It comes with a respectable spec: Pentium 100, 16Mb EDO RAM and a six-speed CD-ROM drive as standard. This matches the spec for October's notebook group test, which Gateway failed to enter in time. The Solo 2100 also has 256Kb of level-2 cache and an 11.3in DSTN screen. The screen can be upgraded to a 12.1in TFT for an extra £450.

The model we tested had a 540Mb IBM hard disk but this will be replaced by an 810Mb HDD when they actually ship, and there is an option to upgrade to a 1.3Gb hard drive for an extra £120. The hard disk is screwed down but is removable. Two screws release only partially so you cannot lose them, and the other comes out completely. Gateway says it screwed it down for extra security, as you would not want your hard disk shooting out if you dropped the machine. The RAM is secured under a screw-down hatch, with one free slot available. Upgrading it yourself would be an easy task.



The make-up of the machine is modular, with the floppy drive and the CD-ROM drive sharing a single bay. A second battery can be fitted in this slot. The drives are fairly easy to get in and out, although the advantages and disadvantages of a swappable system are debatable. All the bays, including the one exclusively for a second battery, face forward. Some may find this an awkward position, especially if you have the notebook propped on your lap to work in the comfort of your own armchair.

There is a docking station port on the back of the notebook but as yet there is no port replicator or docking station available. A port replicator is under development at the moment and should be available by the end of the year, but there are no firm plans for the launch of a docking station. The other ports are quite standard: IrDA, VGA, serial, parallel, audio and PS/2.

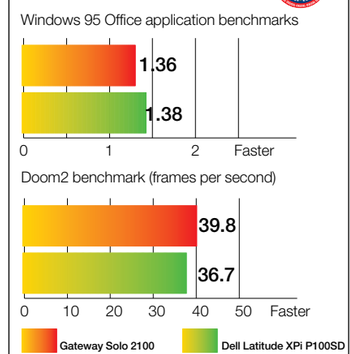
The screen leaves much to be desired. It is DSTN so you cannot expect great things of it, yet even so, the bleeding was bad and the light diffusion was uneven. The brightness and contrast can be controlled from the keyboard, and a small icon appears to track any adjustments you make.

The price is quite respectable for the spec. It additionally includes Windows 95, MS Office Professional 95 and a carrying case, most of which are not included in other manufacturers' base prices.

The performance is equally impressive. Compared with the Dell XPi P100SD, which won our recent notebook group test, it performed better on the Doom test and marginally better on the Office application benchmarks. It comes in at a slightly cheaper price than the Dell on a spec-by-spec basis, so all-in-all it's a sound contender.

Adele Dyer

Performance Results



Gateway's Solo 2100 compared with Dell's Latitude XPi P100SD: the Gateway had the same spec as the Dell, winner of our October notebook group test, and its performance compared favourably. On price, there is very little between them.

PCW Summary

Gateway Solo 2100

Price £1,799 (plus VAT)

Contact Gateway 2000; 0800 342000

Good Points Good standard spec and software bundle.

Bad Points Screen bleeds badly.

Conclusion Good price for performance.

★★★★

p81

Software

Clarion 2.0

TopSpeed's database compiler is fast and capable, if a little quirky.

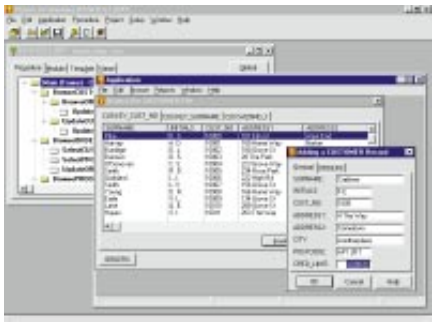
Let's start with the good news. Feature-by-feature, Clarion scores well against competing development tools. From one integrated development environment you can create true executables for either 16-bit or 32-bit Windows. The comprehensive Clarion language now has object-orientated extensions which support the key concepts of encapsulation, inheritance and polymorphism. Visual tools let you construct a graphical interface via drag, drop, and dialogue boxes. Clarion has many integrated database features including native drivers for several data formats, ODBC support, and built-in reporting capabilities. Once a popular DOS database language, Clarion has evolved into a potent resource for Windows. It remains a minority taste, partly due to lack of marketing and partly because the product's resolute individuality places it outside the mainstream.

TopSpeed's CEO, Bruce Barrington, created the Clarion language, and the language reference includes a self-congratulatory foreword explaining its philosophy and how it borrows from other languages such as Modula-2 and IBM's PL/I. He describes it as a general-purpose business language.

Clarion received a boost when it became a front-end to the TopSpeed compiler, giving it the performance of other compiled languages such as C and Delphi. The database handling is conceptually more like dBase than SQL, with constructs like LOOP UNTIL EOF(MyTable) for processing data.

Clarion Version 2.0 introduces a class structure for object-oriented programming. It is a fair implementation, although constructors and destructors, important elements in most object-oriented languages, are not supported. The weakness is that object-orientation has not been properly integrated into Clarion but has been grafted on as an extra feature. Unlike Delphi, Clarion's design is thoroughly procedural, and its visual tools use templates rather than objects. You cannot define visual classes, and there is no class browser.

Clarion's development interface is good



Top Clarion's wizard creates a working database application with very little effort

Centre The Windows formatter lets you design forms with visual tools

in parts. Projects are shown in a tree view, making it easy to organise and edit your data, code and resources. Most Clarion developers use the Application Generator, which generates code automatically, based on your response to numerous dialogues. It is driven by templates held in Clarion's template registry. Each application has a data dictionary, a strong feature which simplifies data handling. A Window Formatter lets you design forms, including VBX and 16-bit OCX controls and a Report Formatter handles reports. Since the IDE is 16-bit, you have to fudge a little to include a 32-bit ActiveX control. OLE automation is not supported.

Building an executable is a two-stage process as Clarion first generates code and then compiles it. This can lead to confusion as errors show up in the generated code but can only be fixed by editing the source. Clarion's Application Generator supported by several wizards and visual design tools let you develop rapidly and effectively once the concepts have been mastered but it is not the easiest of products to learn.

The Clarion community will welcome this upgrade but potential new users will find several things to put them off. It is all very well inventing a new language but it does make it hard for developers to migrate to Clarion. The template-based application generator is powerful but looks dated alongside object-oriented solutions found in Borland's Delphi and PowerSoft's Optima, for example. The manual describes Clarion development as "a personal journey through a series of dialogue boxes," and your attitude to the product will depend on whether you like this way of working.

Compilation to native code is great, but no longer a rarity as, increasingly, other visual development tools offer this feature. The package has rough edges and its interface does not always conform to Windows standards. For a dBase, FoxPro or Visual Basic developer looking for better performance, Clarion is worth investigating but make sure you look at other options, as well.

Clarion will be available in three versions. The Professional release, available now, is the full version complete with chunky manuals. A cut-down Standard release without the printed manuals, report writer or resource editor, should be available in December. The Enterprise version will have team development features and should appear around the same time. Clarion is now distributed by Sapphire, the DataEase company and links between the two product lines are apparently under discussion.

Tim Anderson

PCW Summary

Clarion 2.0

Price Professional version £399 (plus VAT)

Contact Sapphire 0181 554 0582

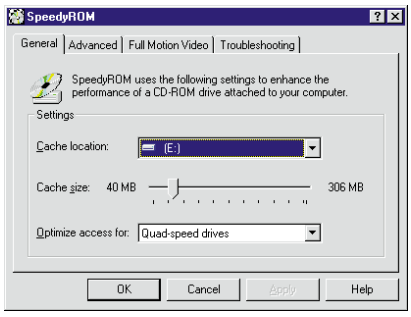
Good Points Targets 16-bit and 32-bit Windows. Rapid development using templates. Business-orientated database language.

Bad Points IDE for 16-bit only. No OLE automation. Unique language. Tools are hard to learn and occasionally quirky.

Conclusion A good upgrade for Clarion users, but will not win many converts.

★★★

p82 ➢



SpeedyROM: Simple interface, modest results

Software

SpeedyROM

Uses persistent cache to make CD-ROM access speedier.

SpeedyROM is designed to speed CD-ROM performance under Windows 95. Since hard disk access is much faster than CD-ROM access, it creates a "persistent cache" on your hard disk, which is saved when the PC is closed down.

What it doesn't claim to do is speed up first-time access to a CD, such as when installing software. Obviously, the data must already be present in the cache for any benefit to be noticed. Neither does it claim to enhance full-motion video performance, other than on very slow drives. As video files can be extremely large and fill the entire cache, the default option is not to store them. It does claim to speed loading, enhance game animation and audio and save time searching reference CDs.

Having given SpeedyROM two weeks to "learn" our quad-speed CD-ROM drive, we tested it using a selection of games: Microsoft Encarta 96, and the Microsoft Technet reference CD. Results were varied, but there did seem to be a consistent improvement. The games loaded between ten percent and 30 percent faster and searches on the reference titles were up to 50 percent faster but it must be pointed out that the Encarta 96 search engine was extremely brisk, even without cacheing. We didn't detect any noticeable improvement in audio or animation, but then, we didn't have any problems there in the first place.

The price paid is in disk space. The manual recommends 20-30Mb be set aside for the cache, and even with this there is a limit to the amount of data that can be stored (this is discarded on a "least recent" basis). Although we found that performance improved, it wasn't anywhere near the "up to 90 percent" claimed on the package. If you're still struggling with a single or double-speed drive, then upgrading to a quad or even six-speed won't cost much more than SpeedyROM.

Tim Nott

PCW Summary

SpeedyROM

Price £29.95 (plus VAT)

Contact Quarterdeck 01245 496699

Good Points Simple interface, good for regularly-run CDs.

Bad Points Modest performance gains on a 4x drive.

Conclusion With 4x drives around £35 and 8x twice that, a hardware upgrade makes more sense.

★★

Software

Mini Office Tax Return '96

Simple help and advice for assessing yourself.

Self-assessment, to be introduced next year, should make completing tax forms a lot easier for the self-employed. You should be preparing for it now by keeping a strict account of your income and expenditure and retaining all receipts. Nevertheless, there is always room for a little extra assistance and there are several software packages around to help you. The latest is Mini Office Tax Return '96 from Europress.

It is an on-screen representation of the tax return form. The three standard Tax Returns, which are issued by the Inland Revenue, are provided: P1 for standard PAYE, form 11 for the self-employed and 11P for high-PAYE directors. You simply fill it in and print it when completed, and the format is accepted by the Inland Revenue.

The benefit of doing this on computer, rather than on paper, is that you can easily and quickly make alterations and additions. You also have access to jargon-free explanations and helpful hints and tips, plus all the relevant Inland Revenue leaflets on-screen. The program can be used by all the family.

Self-assessment, simplified: the Tax Return formats are accepted by the Inland Revenue

Installation is a bit fussy because you have to enter your name and the product serial number, then click a button to generate a code which has to be entered on the registration card and returned to Europress within 14 days. You then receive a password, without which you'll be locked out of the program.

It is difficult to get excited about tax software, which does little more than guide you through what shouldn't be a difficult process to begin with. If your affairs are complex, you should probably employ an accountant. If you are self-employed and have relatively simple accounts, Mini Office Tax '96 is easy enough to use. The help is a boon and it is useful having Inland Revenue forms to hand. But a word of warning: Mini Office Tax '96 is Windows 95-specific.

Paul Begg

PCW Summary

Mini Office Tax Return '96

Price £19.99 (incl. VAT)

Contact Europress 01625 859333

Good Points Lots of jargon-free help.

Bad Points Windows 95-specific.

Conclusion If you have simple accounts, this is a good helping hand.

★★★

p84 ➢

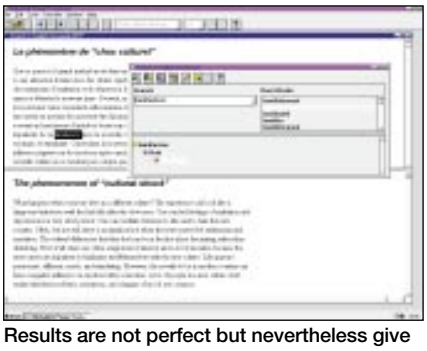
Software

Power Translator

Four-tongue translation software, with a web utility.

Globalink has a raft of translation products, from the cheap and cheerful Language Assistant series to the high-end Power Translator Professional. Power Translator 6.0 is the mid-price product (previously only sold in single language pairs). Globalink is now bundling four languages on one CD: French, German, Spanish and Italian. The aim is to provide a rough translation only. As such, the result isn't perfect, but goes give a good idea of the text. There are also useful interactive translation options which let you have a hand in deciding how the sentence is translated. The code is now 32-bit, and requires 16Mb RAM and 62Mb of hard disk space for all four languages.

A useful addition to the package is a translation utility which integrates with Word or WordPerfect. It is shown as an icon and translates either whole documents or just a section of text. The translation then appears in a Window with options to print or copy it to the clipboard. The web translator utility is the part which would be most useful to the majority of people; it works with Netscape 2.0 or above and appears as a floating toolbar. You just click the translate button, and specify the source and target languages. It is quite slow, even when used over a high-bandwidth leased line, and the results can be quite confusing. Globalink has always stressed its packages work best with input which has been edited first to remove ambiguities and idiom. You obviously cannot pre-edit web pages, so instead you have to take what is there and do the best you can with the results.



Results are not perfect but nevertheless give a good idea of the translated text

The Web Translator links its translated page to the original document, so you can click backwards and forwards to cross-check the translation against the original.

Adele Dyer

PCW Summary

Power Translator 6.0

Price Street price £99 (excl.VAT)

Contact Globalink 0800 752752

Good Points Versatile. Very cheap.

Bad Points Eats system resources for breakfast.

Conclusion An excellent package if you've got the space to run it.

★★★★

Hardware

Europatec Laser 24E

A heavyweight printer to handle continuous stationery, fast.

For large reports, program listings and labels, the dot-matrix printer holds the advantage over modern network lasers via its ability to use continuous paper. But it lacks decent, high-resolution output quality. Europatec has solved this problem with a range of cross-bred laser printers designed to handle continuous stationery. The design combines the pluses of a dot-matrix printer with the speed, tranquillity and output quality of a laser — certainly a strange beast!

In order to use continuous stationery, this main unit sits on a stacking system, putting the whole machine at desk height

The Laser 24E is top of the range. Using a Pentax engine, it prints 24ppm on continuous-feed stationery and has a paper stacker to allow it to run for hours without supervision. It's a big machine: the main box measures 45 x 50 x 24cm (LxWxH) and weighs 25kg.

The top cover opens to reveal the developer unit and OPC drum. Paper is placed over a set of tractor pins and held by two locking levers.

Output is produced at lightning speed in modest 300dpi resolution. Not the most outstanding text quality I've seen in a laser, but it is designed for the long haul. As well as the standard serial and parallel interfaces, there are a range of network options including Ethernet, TCP/IP and Twinax/Coax, making it compatible with AS400 systems.

High-end impact printers can cost up to £9,000 but each page will cost you a fraction of a penny in running costs. This cross-bred laser, although priced at £6,995, will cost you 1.79p per page to run. In this respect, the Laser 24E isn't comparable with traditional high-volume impact printers, but for certain niche applications where consistent output quality is important, it will serve a market need.

Eleanor Turton-Hill

PCW Summary

Europatec Laser 24E

Price £6,995 with paper stacker; £5,995 without (both prices excl. VAT)

Contact Europatec 0171 431 5051

Good Points Innovative use of technology.

Bad Points These days, 300dpi is a disappointing laser resolution.

Conclusion Serves a niche in the market requiring reliable high-volume output of consistent quality.

★★★

p87 ➢

Software

Sage Timeslips

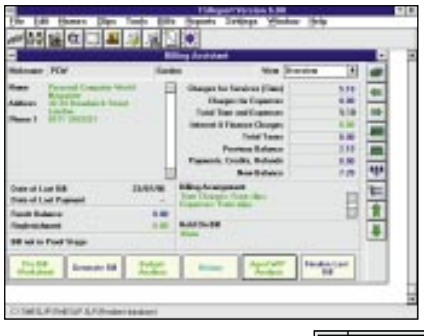
Every second counts towards a bill, with this time-is-money accounting software.

Sage Timeslips time and billing software aims to maximise your revenue-earning potential by allowing accurate activity recording and performance monitoring of employees, clients and business. If you want every second to count towards a bill, this is the package for you.

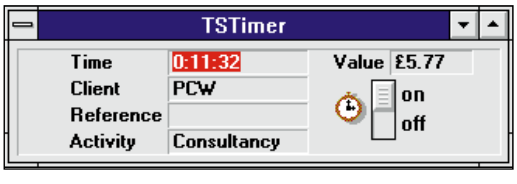
Its concept is to record, on an activity slip (actually a screen representation), all your worktime for a chargeable client. By setting up the configuration modules for clients, users and activity types, the swift working control centre TSTimer allows quick slip creation, switching, and clock timing of these activities. Completed slips are transformed using the module for reports and billings, which include a layout module. All this combines in a package that's easy to install and begin using. Basic information is required for Timeslips, and any work put in at this point speeds the use of TSTimer later on.

Users are set up with nicknames (their shortcut identifier), up to six billing rates and an overhead rate (for contractors who would charge your company, in their turn). Clients (the eventual recipients of your billing) have shortcut nicknames, full names, addresses, salutations, billing rates, balances and funds, flat fees, tax, interest and mark-up rates. All the ingenious and legal revenue-making devices are here in abundance. Client-specific bill formats can be configured and there is space for client notes. Activity lists contain the types of work and comprise a description field, six rates (hourly or flat), and taxes as well as mark-up rates.

Any of this information can be fed into the centrepiece of the package, the TSTimer, which controls the slips. Timeslips assumes that all job slips are similar in format, so the dialogues allow you to quickly set user, client and activity — the essentials for each slip. From a stack of created slips you can select that which represents the work you are about to perform and start timing. Reducing to mini-view (a small floating window) allows other computer work to be performed while the seconds, and your fee, tick ever-onwards.



Above The navigator automates processes while the TStimer (at *lower right*) clocks up the charge
Left The billing assistant collates timeslips, adds mark-ups and taxes, to generate bills and balances
Below The mini-view of the TStimer



Switching between slips is fast and straightforward. Mutually-exclusive timing ensures you are not double-counting your time. If you have a telephony kit, Timeslips can be set to dial a number and record conversation time with your client.

The culmination of the slips is the bill. With the billing assistant, reports can be produced and bills moved from proof stage to final, when they are printed for despatch to clients. Reports and bills are paper-focused, so the printing required to move from proof to finalised bill was an aspect I found annoying in my drive to reduce paper.

Reports and bills are customisable. The sheer awesome professionalism of the bills is worth every penny of the minutely-calculated, value-added, marked-up, itemised fee they detail. No kidding.

Basic operations can be augmented and automated with scripts from a navigator, and frequent system backups ensure the integrity and security of your recordings. It integrates Sage's accounting software too.

In practice, Timeslips ran smoothly on my 486/66 with 8Mb RAM. It required 18Mb of disk space including the import and tutorial options, which were good. The integration of this solid and well-engineered software into your daily work is fairly straightforward if you are desk/computer-bound. It will dramatically change the way in which you are perceived to do business. Accountants, solicitors, lawyers and management consultants would be the principal beneficiaries, where high-value time-dependent activities are involved. A must for anyone who has the gall to confidently bill by the second.

Timeslips is probably not for the disorganised worker who fritters away their time unproductively drinking coffee, chatting or playing games. Freelance professionals may benefit from the framework of billing, but not if their work is a paying hobby. This is sophisticated software that will maximise revenues, but it throws up personal and ethical questions about the mechanical harvesting of money when it is this calculated: I thought I'd never feel that way about business.

Michael Eagleton

PCW Summary

Sage Timeslips

Price Single user £300; £700 for 2-4 users; £900 for 41-50 users (prices excl. VAT)

Contact Sage 0800 447777

Good Points Allows maximisation of time-related charges and bill preparations. Good, solid software.

Bad Points Makes you think about the value of what you do, rather than the quality.

Conclusion For structured work patterns this will record client charges accurately, second by second.

★★★★

Cinemania 97 and Music Central 97

Microsoft's updated film and music titles will jazz up your life.

For those who know these products from previous versions, not much has changed, apart, that is, from bringing the products up to date. The format is common to both CDs and they have the same features. If you are new to them, they are essentially dressed-up databases with a few extras.

Cinemania's home screen has a "Quiz Of The Day" which asks a different question each time you open the program. Similarly, it throws up a still from a film, there to give you ideas of which films to watch. Click on the Why? button to find out why the makers of Cinemania like it, and click on the Review button to read reviews of the film.

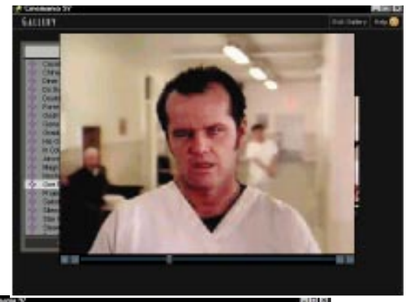
There's a standard format for each film. You get short facts, including whether the film is in colour, what format it's available in, how long it lasts and what rating it is. For each of the 20,000 movies you get two reviews, one written by Roger Ebert and one by Leonard Maltin. Along with a plot synopsis, you get a star rating and a verdict. You can call up a cast and credits lists and a list of awards.

Searching can be done in several ways: by genre, actor, supporting actor, year, director, awards, critics, country or even by word or phrase. How effective the latter is, is dubious, as typing in "frankly" brought up no matches. When I did a year search, 1996 brought up many films. Cinemania is as up-to-date as it can be.

Extra features include the Gallery from where you can get stills, portraits, movie and audio clips, of which there are approximately 35 ranging from "Frankly my dear, I don't give a damn" to " I'll be back". The Tours section features eight tours around subject areas such as Alfred Hitchcock, Great Ladies, and Blaxploitation.

Both programs make good use of hypertext links: response is immediate and the style is slick. There's a List Maker, and a Suggestions feature where you can choose a style or category and Cinemania comes up with a suitable film. It's not specific, but categories include A Good Cry, A Good Laugh and Frothy Fun.

To keep up-to-date, both products have an online section. You can download the monthly updates or more tours, and it offers quick access to movie web sites. Be warned that any updates will take up space on your hard disk.



Top **Jack Nicholson in One Flew Over The Cuckoo's Nest** Left **The Cinemania 97 home page**

Music Central has the same features as Cinemania, and uses the same interface to cover all popular music. Each entry has a biography, picture and discography. You can search by music label, genre, song title, format, or word or phrase, and there are 31 articles of musical events and movements. The Suggestions section improves on the sliding scale of similarity in the last version, which was prone to being unreliable.

Both products successfully cover a lot of ground and don't just stick to the mainstream: a search on French music, for instance, brought up Serges Gainsbourg and the prominent nineties rapper MC Solaar, among others.

Cinemania could appeal to the casual filmgoers or the true Barry Normans among us. Criticisms remain with the limited choice of video and movie clips, but as always, this is mainly due to space restrictions.

Rachel Spooner

Top **In Music Central 97 you get a biography, picture and discography for each entry** Above **Searching**

PCW Summary

Cinemania 97

Price £29.99

Contact Microsoft 0345 002000

Good Points Monthly updates. Nice interface. Covers a lot of ground.

Bad Points Updates take up space on hard disk.

Conclusion Good for the film buff or the casual video-viewer.

★★★★

Music Central 97

Price £29.99

Contact Microsoft 0345 002000

Good Points Doesn't limit itself to mainstream pop music.

Bad Points Limited video clips.

Conclusion Well-designed, informative product for music-lovers.

★★★★

Infopedia UK 96

This compilation of eight reference titles is a true bargain. It's easy to use and is UK-specific.

Infopedia is described as "The Ultimate Multimedia Encyclopedia and Reference Library" and that is probably a fair claim. Certainly, Infopedia looks to be a better buy than even Microsoft's Bookshelf, due to be released at the end of October.

Infopedia is a collection of eight reference works: The Hutchinson New Century Encyclopedia (all 12 volumes!), The Hammond Atlas, The Longman Dictionary of the English Language, The Hutchinson Concise Dictionary of English Usage, The Bloomsbury Dictionary of Quotations, Hutchinson's Info '96, The Bloomsbury Thesaurus and the three-volume Oxford Concise Dictionary of National Biography. They are all accessible from the same interface.

Reference titles like these aren't books you'll necessarily turn to every day; you might turn to English usage once a month, for example, which makes it easy to forget how the software works. A collection of solid reference works with a consistent interface is therefore not to be sneezed at.

When Infopedia is run for the first time you are welcomed by the on-screen librarian and a stack of books. Click on any book and the librarian will describe the book's contents.

You can access the information in several ways. You can browse an alphabetical list of all the topics in the whole reference collection, or type in the word you are interested in. In search view, you can find entries which contain a specific word or phrase. Each entry is preceded by a three-letter prefix indicating the book in which the entry has been found. You might type in "London" and be directed to references in the encyclopaedia, on the map, and even to some quotations. This is all the information you may need for that article, essay or report, plus a few pithy quotes to add lustre, and all at a keystroke or two. You can narrow your searches using the Boolean separators AND, OR, or BUT NOT. Up to four such fields are allowed, which should be sufficient to narrow your search down to precisely what you are looking for.

You can browse a particular book or look for information by subject, or even by entries which are accompanied by photos, videos, maps, sound bites or an animation.

A neat feature is Project View which lets you create your own list of entries. For example, if you were writing a paper on UK prime ministers, you could create a list of entries in the form of a timeline.

Infopedia benefits from a direct link to Microsoft Word. When you are writing in Word, you can highlight a word, click on Infopedia in the View menu (added during installation) and Infopedia is launched with the word, or the word nearest to your highlighted word, already in the Index. You can copy chunks of text and pictures, and even videos, sounds and animations to your written documents. Fairly stringent copyright rules apply, which essentially mean that you cannot alter the copied material in any way or use it in a document distributed for gain.

One problem with reference collections like Infopedia is that you can get some strong titles mixed with a few pretty duff ones. I am one of those people for whom the Oxford University Press still carries considerable weight, and I would have preferred the Concise Oxford Dictionary to The Longman Dictionary, but overall it is difficult to fault this collection. The inclusion of the Concise Dictionary of National Biography makes this a particularly good buy as the full version on CD-ROM from OUP will set you back about three hundred pounds!

Paul Begg

Left **The librarian welcomes you to Infopedia and explains how to use the program**

Below **There are many ways to search for the information you want. You can search a specific book or all the books on the the CD**

PCW Summary

Infopedia UK 96

Price £39.99 (incl. VAT)

Contact Softkey International 0181 789 2000

Good Points A solid reference collection at a bargain price. All UK-specific and likely to be updated annually.

Bad Points Nothing springs to mind and it would be churlish to search for something bad to say

Conclusion Excellent value for money. Solid titles, tidy interface, easy to use, lots of ways to search. A good selection.

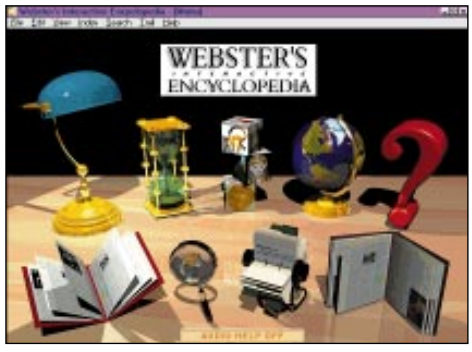
★★★★★

p90

Webster's Interactive Encyclopaedia

Hutchinson by another name, with a few new features and a price tag of under £10.

At first glance, you would think this is actually just the Hutchinson Encyclopaedia renamed, and you would be right. Attica has licensed it to Focus Multimedia and, as Hutchinson is known as Webster in the US, hence the decision to rename it. Hutchinson is still out there, but this is due to run alongside it, at a considerably cheaper price. The influence of the US Webster is there, but the US bias is certainly not as sickening as on the old Encarta.



The new Webster makes nice use of pictures

The basic content and structure remain the same as the Hutchinson. One nice addition, however, is that you can sort by category. These are marked by pictures, and the entries on each category are then sorted by alphabetical list. You can scroll down the list, which is a major improvement on any CD encyclopaedia so far.

The atlas is a bit cheesy. It has a zoom facility which gets you in so far, but no further. There are arrows which give you the impression you can scroll around, but you can only jump from one view to the next. You cannot look at two screens simultaneously and there is no linking, so if you double-click on a place name, you get thrown straight back to "a" in the alphabetical list.

Perhaps the real selling point of this encyclopedia is its bargain price of £9.99. Even though multimedia encyclopedias have dropped their prices considerably in the last few years, none can match this.

Adele Dyer

PCW Summary

Webster Interactive Encyclopedia

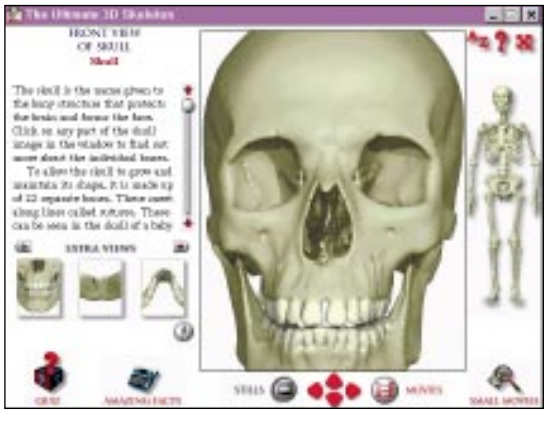
Price £9.99
Contact Focus Multimedia 01889 570156
Good Points A good encyclopedia at a great price.
Bad Points Atlas a little weak.
Conclusion A real bargain
★★★★

The Ultimate 3D Skeleton

This reference tool helps you bone up on the human skeleton.

Dorling Kindersley (DK) has made its name with well-researched, beautifully-presented packages. But as the years go by, one tiny, sneaking, and rather shameful thought comes slowly to mind: its products are just a tiny bit dull.

The Ultimate 3D Skeleton is not the first of its kind: DK has the Ultimate Human Body and Guildsoft has BodyWorks, which includes some 3D modelling. This product counteracts that, however, by the simplicity of its interface. It looks the same as all other DK products, whether electronic or paper-based. The background is white and the text and pictures are neatly arranged. This is fine if you want a reference tool, but it doesn't exactly leap up and grab your attention.



Let's face it: this is what we look like under the skin

In this case, navigating the disk couldn't be simpler because there is only one screen. A full skeleton is pictured on the right of the screen and you click on any part of it to access the details of bone groups; the main views for each section can be rotated. In addition there are numerous other views, each showing a particular bone or aspect in greater detail — for the most complicated structure, the skull, there are 29 secondary views. To go with each, there is a short piece of text explaining the function, movement, development and purpose of each bone.

It is a wonderful reference tool — well-researched and good-looking; but you would have to be more than a little interested in the subject to be taken by this product. The 3D aspects are great, but to become a thorough reference it could do with more of the muscle ligaments being shown.

Adele Dyer

PCW Summary

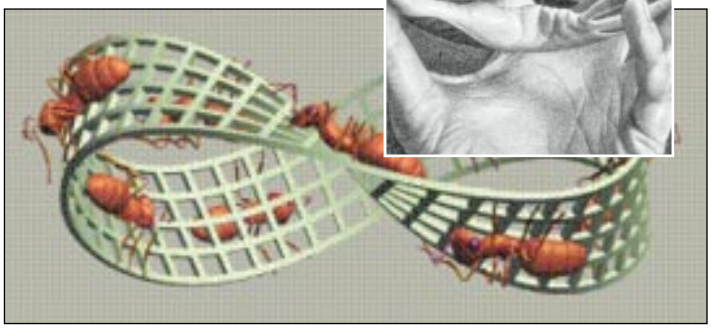
The Ultimate 3D Skeleton

Price £29.99
Contact Dorling Kindersley 0171 753 3488
Good Points Well organised. Excellent graphics.
Bad Points Limited to bones only.
Conclusion Excellent as far as it goes.
★★★

p92 ➢

Escher Interactive

From the pre-PC age, art that complements the computer perfectly.



MC Escher, and his Ants Walking A Moebius Strip

MC Escher's beautifully-graphed ambiguities have been among the defining images of our time, perhaps because they reflect the paradoxes of twentieth century physics. The gallery of his work, which forms the kernel of this Thames and Hudson CD, shows that although he died in 1972, just before the advent of the PC, his images often anticipate computer graphics with their exploration of iterated motifs.

The CD attempts what Escher might have done with computers. It includes six animations based on Escher images, including one derived from his depiction of ants walking a Moebius strip: a one-sided, one-edged surface, topologically one-dimensional, existing in three spatial dimensions and depicted in two, with the animation adding a time dimension for good measure.

Tessellations, or tiled designs, were another Escher fixation: Escher Interactive justifies its title by allowing you to create and print your own from a set of templates. You get a series of puzzles where you are invited to construct paradoxical objects from a kit of primitives.

This is all good stuff, the CD taking it way beyond what could be achieved in a glossy art book, but it could do with more of the old-fashioned words. A visually intriguing module called Spheres comes with no explanation of what you are expected to make of it, and the spoken commentary to a brief pictorial biography of Escher is apparently pitched for a class of American 12-year-olds. But don't let this put you off. If you like Escher's work, this is a treasure house.

Clive Akass

PCW Summary

Escher Interactive

Price ££49.95

Contact Thames and Hudson Interactive 0171 636 5488

Good Points Lovely pictures. Good use of interactivity.

Bad Points Pictures left too much to speak for themselves.

Conclusion Great for Escher-lovers.

★★★★

The Times 1996

Good for schools or as a home reference tool, this product covers the first three monthe of this year.

Read all about it!

Hang on, you think, we are only three-quarters of the way through the year and The Times is already publishing its review of 1996. Has Mystic Meg been drafted in to predict the events of the rest of the year? Well, no. The Times is a weighty tome on its own and The Sunday Times is positively elephantine, so the paper version can quite easily fill several CDs. As it is, this disk contains only The Times and The Sunday Times for the first three months of this year, while the ingeniously-engineered box leaves room for a further three disks. In other words, you really must register it to be sure of getting the updates as they appear.

The search facility is fairly simplistic. Simply decide what you want to search for and where you want to look for it: in the headline, the story, the picture, the byline or in a certain section, such as home news or letters to the editor. The search categories cannot be combined to narrow down the search, so if you wanted to find all letters to the editor on the subject of the divorce of the Prince and Princess of Wales, you would either have to select the protagonists by name, or search through all the letters published so far this year. There is an option which allows you to look at the headlines of the category you have chosen so you can then flick quickly to that entry.

The quality of the material I pass no judgement on, as the newspaper style you prefer is a personal thing. However, the search engines on this CD could do with a polish to make it a truly useful reference tool.

Adele Dyer

PCW Summary

The Times and The Sunday Times 1996

Price £175 (plus VAT) for schools, £299 (plus VAT for a year's subscription

Contact News Multimedia 0171 782 3972

Good Points Packed full of detailed information.

Bad Points Search facilities not great.

Conclusion A fascinating archive.

★★★★

Software

Toy Story Animated Storybook

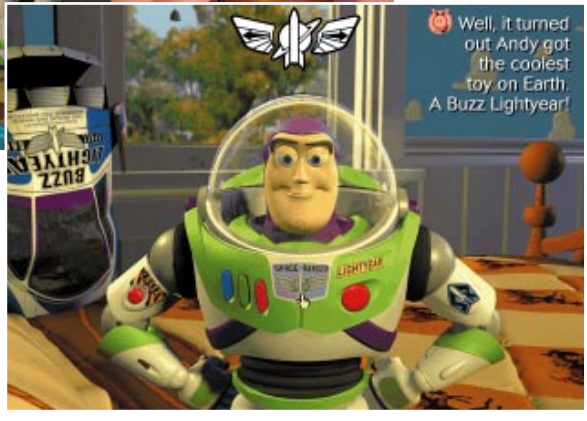
Disney Interactive brings Buzz Lightyear and Woody to the PC screen.

Following The Lion King, Pocahontas and Winnie the Pooh CD-ROMs, Disney seems to have a niche market in multimedia storybooks and games based on movies. Now comes the animated storybook of Toy Story which should be available from the end of October. Toy Story, the movie, is the first completely computer-generated feature film and Disney Interactive claims that the subsequent CD-ROM, jointly developed with Pixar, is its most technically advanced to date.

The storybook is recommended for children from three to nine years old, and those who saw Toy Story will especially appreciate the superb graphics and 3D animation, which are as good as in the movie. The sound effects are excellent and there's music from the movie as well as previously unseen footage.

Toy Story is the tale of two toys: Woody, a wooden cowboy, and Buzz Lightyear, a spaceman. They begin by hating each other but eventually become the best of pals. They both belong to a little boy, Andy. Woody used to be Andy's number one toy, but when Andy is given Buzz Lightyear for his birthday, Woody gets jealous. Andy proceeds to devote most of his time to playing with Buzz, "the coolest toy on earth". Feeling rejected, Woody schemes to get rid of the spaceman. Buzz, meanwhile, refuses to believe he is only a toy and thinks he is a genuine space ranger who must protect the galaxy from imminent invasion. One incident leads to another and the two have to battle together, instead of against one another, if they are to survive at all.

Their relationship develops through the fifteen different screens of the storybook which include plenty of hot-spots to involve you and let the story progress. There are some entertaining extras if you click on the right hot-spot, such as Buzz occasionally breaking into a dance. Some screens include additional features where you can manipulate objects — this usually occurs in the games — or use a virtual torch to look around a darkened room. One scene even allows you to view Buzz glowing in the dark if you pull down the blind.



Left Andy's toys set eyes on Buzz Lightyear for the first time
Below "It's a secret mission in unchartered space. Let's go!"
Bottom The choice screen where Hamm is your guide and narrator

Hamm, the piggybank, is your guide and narrator. You can sit back and listen or take part in the action. Hamm's words are written on the screen and highlighted as he speaks, to help children with reading. Any word can be clicked on later and Hamm will repeat it to help recognition of individual words. There are some fun games which teach children to differentiate objects by shape and colour, and some more complex games to develop problem-solving and concentration skills. The games have various levels of difficulty so children of all age groups can enjoy them.

Other characters in the story add to the entertainment, such as Slinky Dog and Rex, as well as nightmare neighbour Sid's multi-transplant toys. Disney Interactive will be releasing its first game for the PC, the Toy Story video game, which will be available from mid-November to follow on from the animated storybook.

Joanna Scott

PCW Summary

Toy Story Animated Storybook

Price £39.99

Contact Disney Interactive 0171 605 2400

Good Points Excellent graphics. Easy for children to use.

Bad Points Parents might have trouble borrowing it from kids.

Conclusion Enjoyable and entertaining.

★★★★

p99 ➢

Muppets Inside

The muppets have invaded your PC! Restore order with the help of Kermit and co.

"It's time to boot the disc up, it's time to turn stuff on, It's time to meet the Muppets on the Muppet CD-ROM!"

Even those who don't like puppets can't help but like the Muppets, Jim Henson's loveable cloth creations. Fresh from Treasure Island, Kermit and friends are back to save your PC in Muppets Inside, a multimedia misadventure.

Following a freak accident with the installation routine, data on the Muppet CD-ROM is scattered throughout your system. Together with Kermit and furry funnyman, Fozzie Bear, it's up to you to repair the damage by competing in a series of challenging games. You'll also have to rescue nine other characters who've managed to get themselves zapped and trapped inside key parts of the computer.

To move things along, Fozzie and Kermit travel across the motherboard at speed by driving the PC's DataBus. A map inside shows the location of the first few games and a quick click with the left mouse button takes you to the action. Complete these and more pathways are revealed, eventually leading to freedom, dinner and a light dessert.

Typically muppetised games include unscrambling video clips in Beaker's brain, a play on Celebrity Squares called Trivial but True, and the Swedish Chef's version of Doom. The latter puts you face-to-face, armed only with a hand whisk, with an army of rampaging carrots. Not for the faint-hearted.

The presentation is first class, with smooth animation and some of the best video ever seen on the PC. Everything runs in high resolution and the detail is crystal clear, although you need at least a Pentium 90MHz for best results. Sound is just as good, containing music from the hit TV series and voiceovers from the original stars.

Chris Cain

PCW Summary

Muppets Inside

Price £29.99

Contact Ocean 0161 832 6633

Good Points Packed with humour.

Bad Points Games are unlikely to tax you for very long.

Conclusion A must for Henson fans.

★★★★

Survival: Mysteries of Nature

With this CD-ROM, you can learn about flying, hunting and the senses.

At first glance, Survival: Mysteries of Nature offers a great deal; not only an insight into nature, but also access to the library and experience of the natural history TV programme, Survival. What you get is disappointing, as the finished product is the material with which the creators should have begun.

The CD-ROM contains three documentaries: Flight, The Senses, and Hunter and the Hunted. Each documentary is an exploration of some of nature's strangest and best-adapted wonders, and the narration, by Ian Holm, is superb. You can jump from one part to another with the ease of changing tracks on an audio CD. You can extract graphics to use in your own work, as long as it isn't sold for gain. This said, I can't help but wonder whether the documentaries wouldn't have been better on a video.

The advantage of the CD-ROM is the ability to stop it and explore in greater depth. Sadly, the quantity of in-depth information is minimal. Given that whole books, to say nothing of documentaries, have been written about many of the individual animals featured here, the paucity of information isn't likely to satisfy a child's curiosity.

Classroom users can save their places when exiting, thereby being able to start again at the place where they left off.

Mysteries of Nature is supported by extra learning materials on the web, at www.anglia.co.uk, and more comprehensively on AOL UK (America On-Line). Use the keyword ANGLIA for quick access. Survival also has its own site on AOL whose keyword is SURVIVAL.

Paul Begg

PCW Summary

Survival: Mysteries of nature

Price £19.99

Contact Anglia Multimedia 01603 615151

Good Points An interesting subject with informative documentaries.

Bad Points Not enough information. Few real benefits from being on CD-ROM.

Conclusion Better as a video with accompanying booklet, and, as such, less expensive.

★★★

p100 ➢

Terratopia

It's beautiful, fun and educational. What more could you want?

Above Learn about the exotic wildlife that inhabits the island
Left The environment is beautiful in Terratopia
Below The home screen gives you options of what to do
Bottom Autumnal colours on Terratopia: you can learn things about many different environments, including ancient ones

Terratopia is a graphical adventure which aims to increase the environmental awareness of children and their parents. It takes place on an exotic island and the players must solve puzzles in different ecosystems. There is lots of wildlife on the island, and the handpainted sets are full of interesting details.

An introductory cartoon shows the morphing powers of the existing terratroopers. They are energetic children who can change into pumas, eagles or dolphins in an instant. While playing, you can consult an illustrated book which describes the characteristics of different wild animals. There are many ecological facts to be learned along the way. The cheat sheet is useful because, with over two hundred screens, you need a few hints to get started. When you start a puzzle, two natives are on hand to give hints on how to win the game and claim your prize, namely, a totem. Winners can even print their totem certificate. If you're looking for action you may be disappointed, apart from one stunning scene where a tyrannosaurus rex runs towards you and tears the screen apart with its talon.

Terratopia is for children with an interest in wildlife, who will enjoy discovering new facts about ancient environments and appreciate the wealth of detail on-screen. You will need patience, as the games are far from easy: finding, not to mention completing, all 13 of them is a task that will take several hours.

John Cooper

PCW Summary

Terratopia

Price £29.99

Contact Funsoft 0181 748 7565

Good Points Beautifully-designed screens. Original idea.

Bad Points Slow-moving: the plot is over-complicated.

Conclusion A well-designed, inexpensive cross between a wildlife encyclopedia and an adventure game.

★★★

Long Term Tests

1 YEAR TEST

Hardware

Adams Accura 586

Resilience in the face of rough treatment is what characterises this much-loved system.

The Adams came into the *PCW* office as a virgin P120 armed with 16Mb RAM and a 1.1Gb hard drive. The 17in monitor is the above-average Iiyama Vision Master 17, no doubt helped by the Matrox MGA Millennium card lurking inside. Sound is provided courtesy of a Creative Labs SoundBlaster AWE-32 and the CD-ROM is a 6x TEAC drive.

The Accura has not been treated kindly. It's been partitioned, unpartioned, repartitioned, had multiple operating systems shoved on it, been used as an internet web server and has become a 24x7 machine. The number of impatient reboots must run into hundreds, with beta software creating total freeze-outs and little thought being given to letting the system spin down properly. Not recommended.

It was perhaps not surprising that something began to give. I first noticed that the Adams was not giving its best about three months ago. It was ridiculously slow for a Pentium 120, and the floppy drive had begun to spin on its own at odd intervals. Most bizarrely, it did this every time an email was sent via ccMail. I never did figure that one out. The hard disk just didn't sound healthy. A check on the system revealed that everything was running in 16-bit DOS-compatibility mode. System startup was full of errors and missing config.sys files.

I took the plunge: Format C. Everything went well until I tried rebooting. DOS was installed but the drive just refused to boot. Instead, I got the weirdest message: "Boot 4". Huh? I tried another install. This time I got "Boot 2". Well, at least it was going down. After that, the Quantum drive just failed.

The only solution was to install a new HD, and a Quantum 850Mb Trailblazer was duly sourced. After a minor fiddle with the BIOS, letting the new drive become buddies with the rest of the Adams' insides, we were away, and the reinstall of Windows 95 went smoothly. It was refreshing to see the Adams start ripping through its stuff at a full 32-bit 120MHz combo mode once again. I'm down to 250Mb of space, but I shall be more circumspect about what gets squirted down from the net.

Despite its problems, the Adams never gave up, and if I hadn't gone through the painful reformatting period, it would still be hanging in there allowing me to get on with my daily tasks. It should be pointed out that most of its problems were probably due to user interference rather than in-built faults.

The fact it coped is some testament to this machine, which is probably now running more sweetly than ever before. My only real gripe is against the keyboard which I've always found uncomfortable. I would change that if I could.

PJ Fisher

PCW Summary

Adams Accura 586

Price £2,749

Contact Adams 0161 877 8822

Good Points Reliable, runs quietly, fast when properly configured.

Bad Points Keyboard proved uncomfortable.

Conclusion Considering what it has been through, this has proved a resilient and reliable system.

★★★★

9 MONTH TEST

Software

Windows NT 3.51 Workstation

Provides stability and security and is nice to work with, but will not suit everyone.

Windows NT 3.51 Workstation gives reliable and safe performance once it's up and running, but if your needs are simple, it's best avoided.

I bought NT for two reasons. Windows 3.11 started to crumble under some of my programs, such as Help authorware and specialist engineering packages. General Protection Faults would crash the system daily, or I would get messages telling me that I had run out of resources or that I had insufficient memory despite 32Mb of RAM. A crash used to corrupt files and on two occasions I lost several hours' work. With NT, these problems are a thing of the past.

The second reason was that I had one project where the client specified something called C2 security. I haven't a clue what that means, but only two PC programs at the time offered this: OS/2.0 Warp and Windows NT 3.51. I chose NT because I was used to Windows.

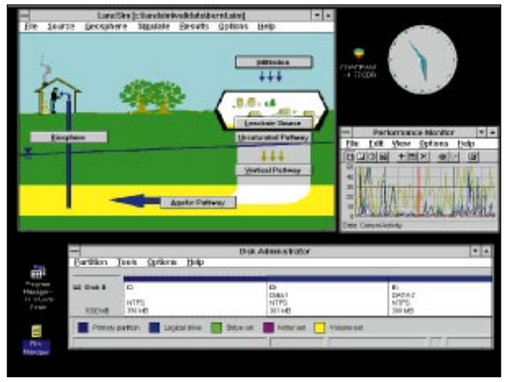
Setting NT up to run properly takes a bit more effort than other variants of Windows. It is demanding of hardware: Microsoft says that NT will happily run on a 486DX with 12Mb of RAM. Happily, but slowly. My main machine is a Pentium 100, and when running 32-bit software it works better than any other version of Windows. Many PC vendors are pushing the Pentium Pro as an entry-level system for NT, but I have seen NT run well on a 486DX2/66 with 16Mb RAM. The more memory, the better.

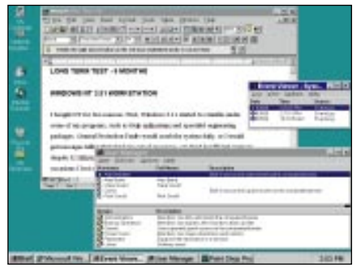
In many ways, working with NT is a pleasure. Version 3.51 can use either the old Windows interface or the wonderful Explorer GUI. Programs with a habit of crashing will still crash, but do so in their own space and will not bring down any other programs or the operating system. NT has a useful array of administrative and diagnostic tools, including the Event Viewer which keeps track of things which go wrong, often telling you why they happened.

NT is very stable. I often run compilers or modelling programs in the background while doing something else, without worrying about it. A boon is file security. Format a data-disc under NT's own file system, and only NT will be able to access the data, and only if the user has the correct password.

One machine running Workstation can be set up to serve several users, each with their own assigned privileges. So users can be prevented from doing anything except their own work and backup copies.

Yet, there have been problems. The first is that NT is quite poorly supported. Not all 16-bit or even 32-bit programs will run properly under it, if at all. All the versions of Corel Draw, from 4.0 onwards for example, suffer some sort of problem with saving or loading files. Surprisingly, some of Microsoft's own 32-bit software suffers various glitches.





Above **You can run compilers in the background without worrying about crashes**

Left **User Manager lets you control what different users can access**

A greater problem is drivers. On the whole, 16-bit drivers and NT do not mix, so peripherals like scanners and fax modems can be a nightmare. This is ironic, since NT naturally excels at networking or graphics applications, which tend to depend on peripherals. Ask Hewlett-Packard, for example, for advice on getting its scanners to work with NT, and it will direct you to a CompuServe forum. Have a look there, and you will find hundreds of messages from people trying to solve the problems with HP software running under NT.

And even when third-party drivers do exist, they may not work as well as those supplied by Microsoft. In my PC, NT correctly identified an S3 968 chip on my graphics card and loaded an excellent driver which, for some peculiar reason, worked much better than that provided by the card manufacturer.

This lack of support and compatibility could be a major hurdle in Microsoft's plans for NT. This is a shame, because this true 32-bit OS is far superior to Windows 3.11 or Windows 95. On the other hand, Microsoft is aware of the problems and has addressed some of them in NT 4.0. This version includes code which allows 16-bit communications software to work seamlessly with NT. Let's hope third-party suppliers take note.

So would I recommend it? If you need the stability or the security, then the answer is yes. But avoid it for now if your needs are relatively simple. In any case, check to see if both your hardware and software are compatible, because a great deal is not.

Rick Gould

PCW Summary

Windows NT 3.51

Price Server and five-user licences £650 (£325 upgrade). Workstation £250 (upgrade £120)

Contact Microsoft 0345 002000

Good Points Stable and secure.

Bad Points Bad support for 16-bit applications and drivers.

Conclusion Look out for NT 4.0.

★★★★

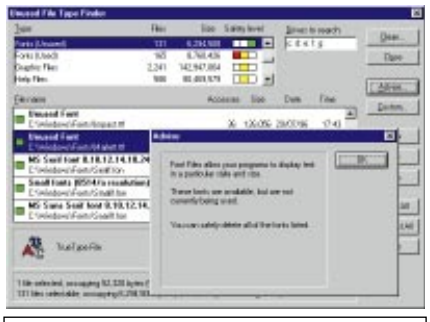
p104 ➢

Software

Cleansweep 95

Keeps your hard disk in shape, but tends to give erratic advice.

6 MONTH TEST



Left Fight the flab, but remember the backup **Below** Watch out! It is not safe to delete ALL these

Cleansweep is a set of utilities designed to keep your hard disk lean and clean. It offers Wizards for uninstalling programs or archiving rarely used ones in compressed form. There are tools to find duplicates, "orphaned" DLLs, and various other disk devourers such as temporary files and "lost clusters" rescued by Scandisk. On the proactive side are two monitors that load on startup: one warns of files that haven't been used for a specified time, and the other logs all changes made to your PC by installation routines.

The default option is not to delete surplus files immediately, but to back them up in compressed form so the full disk savings aren't immediate. Cleansweep will remind you of the backups in due course and offer to delete them permanently if nothing has complained. This is just as well, as the advice offered is often wrong. It told me I could safely delete a stack of "unused" fonts, including some required by applications and the essential system font "Marlett.ttf". The orphaned DLL finder was equally erratic: it told me to delete several of Windows' fax and internet components and DLLs belonging to a program I had installed two days previously. But, treading carefully, I clawed back over 30Mb on the first outing.

Although Windows 95 applications should have an uninstall option, "legacy" software and a lot of the betas I see, don't. The installation monitor sits waiting for an installation routine to be run, and compiles a report of what has been added to your system. Again, it's flawed. There's no built-in way of searching the reports to find what installed a particular file. Worse, it misses some files, includes ones that aren't relevant, and doesn't record altered files, so if a vital DLL has been replaced by an older version, you are not necessarily informed.

Tim Nott

PCW Summary

Cleansweep 95

Price £39.95
Contact Quarterdeck 01245 496699
Good Points Can save money and megabytes of disk space.
Bad Points Erratic, and often gives the wrong advice.
Conclusion You need to know what you're doing — not recommended for beginners.
★★★

Hardware

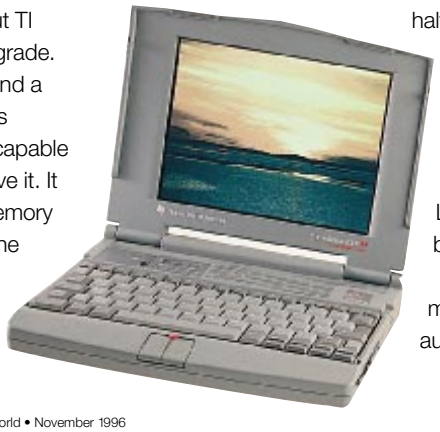
6 MONTH TEST

Ti4000M and docking station

Not only compact and portable, this notebooks sounds great and has a good screen

Texas Instruments' Ti4000M was last reviewed in the October 1995 issue of *PCW*. I looked at a 486DX/100 and its docking station and have subsequently used it for six months. The first thing to hit you is the compactness of the machine. Even with its docking station, it is still very small. The 9.5in TFT display was stable and did not have any problems with moiré or bleeding.

The original machine came with 8Mb of RAM, but TI provided a 12Mb upgrade. With 20Mb of RAM and a 525Mb hard disk, this machine is certainly capable of doing any task I give it. It has not run out of memory with anything I've done over the six months.



The floppy disk drive was initially fiddly to use, but after a couple of weeks I got used to it and now it is no problem at all. Access to the serial and parallel ports is blocked when the notebook is docked. The corners of the docking station are too close to bother the comms ports, so brute force and willpower are needed to jam in any peripheral cables.

A concern for all notebook buyers is battery life. The TI's battery lasts for about four hours, and takes about two and a half hours to recharge. TI's own power-monitoring facilities are especially good and there is considerable scope for personalising the setup. Look carefully at these before you start work.

Early on in the six months, I turned off the audible alarm and didn't notice the red "low power" light until it had shut down and I had lost over three quarters of an hour of unsaved work in Excel.

Even that incident did not turn me off this machine, and I have been happy with my choice of notebook. It is capable and reliable (once you personalise the power features), attractive and highly portable. This is definitely a machine I would recommend.

Melvyn Mildiner

PCW Contacts

Ti4000M

Price £2098 (replaced by Extensa 570CD, 16Mb RAM, 525Mb HDD and 11.3" DSTN screen.
Contact Texas Instruments 01234 270111
Good Points Sound facilities, display, size and power-monitoring facilities
Bad Points Nipple, disk drive and the blocking of ports by the docking station
Conclusion A great portable machine
★★★★

Triple jump

Just look at them go! Modem speeds are increasing by leaps and bounds. Adele Dyer tests the first three V.34 modems on the market to support speeds of up to 33.6Kbps.

Just as you get your head around the psychobabble that is modem standard names, things become complicated again. The ITU-T (International Telecommunications Union — Telecommunications Standardisation Sector) is about to ratify an enhancement to the V.34 standard.

At present, V.34 supports speeds of up to 28.8Kbps. The enhancement will take the maximum speed possible, across analogue lines, to 33.6Kbps. The extension also allows for a speed of 31.2Kbps.

Since its introduction, V.34 has become the only standard worth considering. It has several overwhelming advantages over all previous standards. The original is capable of supporting data transfer rates of 28.8Kbps without compression, is able to adapt to line conditions and is backwards compatible with V.32 and V.32bis. In short, it is the only sensible standard to opt for if you want to cut your phone bills and ensure maximum compatibility with any modems you might want to connect to.

As the new speeds are essentially just extensions to the old tried-and-tested standard, the gains are all on the side of the user. You can reduce your phone bills if you are communicating at the top speed but your modem will still be able to reduce its speed when talking to a slower modem.

The overall feeling from the modem manufacturers is that the next move will have to be away from analogue to ISDN. You may remember they said the same thing about 28.8. The move up to 33.6 has been squeezed out of existing technology, but that technology has probably reached its limits and you can expect to finally see the much-vaunted "year of ISDN" next year.

At the time of going to press, only three manufacturers had products ready for testing: US Robotics, Motorola and BT. Over the coming weeks and especially once the ITU-T has ratified the extension to the standard, you can expect all the larger manufacturers to jump onto the 33.6 bandwagon.

The BT Prologue: the case will be different but the innards remain the same

BT Prologue V.34EX "Plus"

We saw a pre-production model of the BT Prologue V.34EX "Plus". Essentially, the machine we received is exactly the same as the full production model, but is housed in the Prologue V.34EX case. The full production model, replacing the V.34EX, will not have the digital display on the front telling you the speed at which you are connecting. As you might expect from a modem marketed by the people who probably deliver the signal into your home or office, there is a phone-through socket which allows the line to be shared with a telephone.

The other most notable features of this modem are aimed squarely at the business user. These include dial-back security, which lets you protect important data. Anyone who tries to connect must first enter a password and the modem then disconnects and rings back the authorised user. Remote configuration and a "Call-Back" request are available, too, and tallow you to instruct the modem to call you back when you are at home or out on the road.

The Prologue V.34EX "Plus" is naturally backward compatible with all speeds. It features MNP10 error correction and V.29 "Fast Connect" for rapid connection to online services. The bundled software includes WinFax Lite, ComIT and BT Internet.

PCW Contacts

Prologue V.34 EX "Plus"

Price £139 RRP (plus VAT)
Contact Telecom Marketing and Distribution 01784 421123

Motorola Premier33.6

Motorola is well known for its wide range of communications products, including mobile phones and data cards. It was therefore no surprise to see it among the first to produce a 33.6Kbps modem. In fact it was the only one of the three to send it to us shrink-wrapped and ready for the market. Motorola is also the only one of the three manufacturers to feel sufficiently sure of future enhancements to the V.34 standard to bundle a flash controller and flash DSP RAM. It has password security and the configuration can be changed remotely by an authorised user.

(Left) Motorola Premier 33.6: a stylish exterior for the business user

One interesting feature is Motorola's Automatic Rate Adaption. While the ability to adapt to phone lines on-the-fly is a part of the V.34 standard, our labs manager noticed an increased ability in the Motorola to return to 33.6Kbps operation after having had to drop down to 31.2Kbps. When transmitting large files, this may prove to be of more use than more regular high speeds over brief connections.

The Motorola has the capacity for 20 passwords and 20 phone numbers and is compatible with two-wire leased-line operation.

It comes bundled with QuickLink II FAX for DOS and Windows and is voice-enabled through the QuickLink Message Centre. This allows several voicemail boxes to be set up and automatically separates voice and fax calls, dealing with each as appropriate. It will even bleep your pager when fax and phone messages arrive. One other nice touch is a button to let you turn off the volume so you don't get a high-pitched squeal once it has connected.

PCW Details

Premier 33.6

Price £242 (plus VAT)
Contact Motorola 01635 564467

PCW Contacts

Sportster Vi

Price £199 (incl. VAT)
Contact US Robotics 0800 225252

US Robotics Sportster Vi

US Robotics has gradually carved a name for itself in the modem market. It was the first to the market with a 33.6Kbps modem and was ready for the new standard long before its competitors. In fact while the other manufacturers had to send us their new products specially, US Robotics calmly announced that the 28.8Kbps modem we already held (in our offices for another test during the past few weeks) was already capable of the higher speeds.

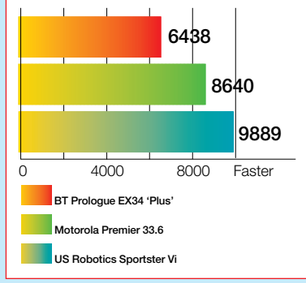
The US Robotics modem was the fastest in our tests, connecting more often than the others at 33.6Kbps. As a V.34 modem it also supports 28.8Kbps and is backwards compatible with speeds as low as 300bps, as well as V.32bis, V.42 and MNP 2-4 for error control, V.42bis and MNP5 for data compression and V.17 for communication with Group II fax machines at 14.4Kbps.

How we did the tests

We tested the modems in pairs using a line simulator. We sent out seven different file formats, 100 times each. The number of dropped or failed connections were monitored as was the speed of the connection. The results are in characters per second rather than bits per second as this gives a clearer indication of how quickly you are likely to get usable data, after all the extras bits that have to be sent with each packet have been stripped out. The results are then weighted according to the type of compression typically used on each format. Although we have not mapped this in the results, we found the majority (60 to 75 percent) of connections to be at 31.2Kbps, the rest being at 33.6Kbps.

Performance results

Modem performance graphs (weighted characters per second)



US Robotics Sportster: the fastest thing on analogue, with voice facilities

Good show

Ken MacMahon reviews four of the latest posse of PC-based presentation packages which claim to offer the tops in features and ease of use.

Multimedia was once called audiovisual, and a carousel projector was as sophisticated as it got. The latest batch of presentation packages makes it easy to produce slick, well co-ordinated presentations in less time than it takes to say dim the lights. PC-based presentations offer the advantage of sound, animation and video, and stunning transition and build effects will help keep your audience hooked. Most packages offer a standalone player so, once a presentation is completed, it can be run on a notebook at the presentation venue, or viewed by participants in a network conference. What's more, they allow you to produce your own speaker's notes and handouts for the audience.

Here we've looked at four packages which claim to offer the ultimate in features and ease of use. Fancy features like animation, multimedia and network support count for a lot, but if you've got a deadline to hit, ease of use comes top of the list. Perhaps surprisingly, the cheapest package we looked at was also the easiest to use.

Designing a good presentation

Whenever you design anything, the single most effective rule of thumb worth remembering is to keep it simple. Generally, the more fonts you use, the more whacky the transition effects with which you introduce each slide, the greater the diversity and variety of your backdrops, the messier and more difficult it will be to understand your presentation. Don't lose sight of the fact that the aim is not to impress your audience with your expansive command of the features of your software, but to get the message across clearly, simply and effectively. It's worth deciding on a few things before you even go near your PC. When the pressure is on, the temptation to just bang in the text and figures and worry about how it looks later is great, but a few minutes spent now will save you lots of time later.

Colour

First choose a colour scheme. This might be dictated by corporate style, in which case you are lucky because someone else has done the work for you. Don't waste time reinventing the wheel: if everything your organisation does is in white type on a dark blue background with an orange logo, you do the same (you'll probably have to anyway).

Fonts

Likewise with fonts. Try to identify the fonts your company uses in its corporate literature and use them. If you don't have the identical fonts, use something similar. This has the twin advantage of saving you the bother of having to think about it, and leaves you secure in the knowledge that it has been tried before and that it worked.

In the absence of any corporate style guidelines choose contrasting colours for type and background that are easy to read and, at most, use two fonts — one for headings and another for smaller type. If you want to give a weighty, corporate feel to your presentation, choose dark blues and greens for backgrounds and a serif typeface, such as Times, Garamond or Palatino, slightly condensed if you want to fit more text in. Other than slightly condensing type don't be tempted to stretch, squeeze or otherwise mess around with typefaces — they usually work best the way they were designed. Sans serif typefaces, like Helevetica, Universe, Avant Garde, Franklin and Frutiger, give a more modern, less stuffy feel.

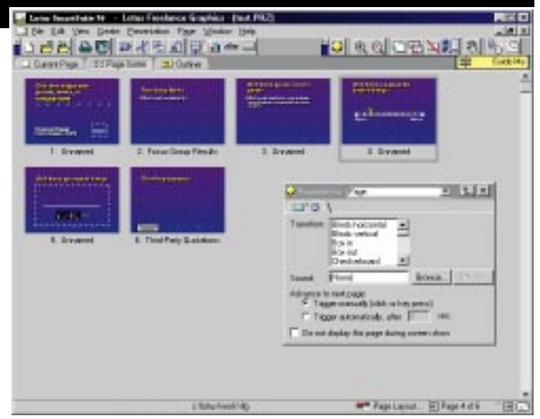
Logo

Usually you'll need a logo of some sort on the page. Don't be tempted to make it too big. Most of your audience probably knows who you are and it's only there for reinforcement. A small neat box in the bottom right-hand corner usually does fine. If you must have it big, fill an entire slide with it and put it at either at the beginning of the show, or at the end, or both.

Templates

Lastly, use the templates provided which are usually pretty good. Take note of the relationship between the size of the header type and the rest of the copy on the slide, and try not to change the relative sizes too much. Avoid the temptation to squeeze a dozen bullet points, or a 200-word mission statement, onto one slide: it'll be too small to read and no one will remember what it said even if they bothered. Split large lists or blocks of text into two or more slides or, better still, cut the copy. If it won't fit onto one slide, you're probably trying to say too much.

Lotus Freelance Graphics 96



As a SmartSuite user, you are unlikely to go out and spend money on a presentation package unless the one you've got really stinks. Although this may have been the case with previous versions of Freelance Graphics, the 96 version is an altogether different and much superior product.

The default installation from the CD loads the application, dictionaries, spellchecker, tour, and about 3Mb of TrueType fonts, taking up around 42Mb of disk space. In addition to the tour, Windows help and printed documentation there's an on-line manual in Adobe Acrobat 2.1 format.

SmartSuite uses SmartMaster templates as the starting point for presentations. Smartmaster templates are content rather than style based. They include options based on the Kotler Marketing Group's four-step Marketing Plan Collection and a marketing proposal based on the product differentiation strategies devised by Jack Trout and Al Reis. As well as more generic options like team meetings, new market entry proposals and product launches, there are SmartMaster templates based on the theories of other marketing gurus including Joseph Juran, Ken Wax and Zig Ziglar. So, if nothing else, it will appeal to the business schools.

The Freelance interface is now a much more pleasant environment in which to create presentations. Page tabs allow easy switching between current page, page sorter and outliner. In either mode the top toolbar provides access, among other things, to filing and editing facilities, chart creation and text editing. A user-definable smarticons palette provides other context-sensitive options. The current page window also provides a palette of object-drawing tools.

Freelance falls short of the competition in certain respects. Its transition effects fall well short of what PowerPoint has to offer both in terms of variety and control, and build effects are similarly limited.

The obvious advantage for those operating in a Lotus environment is that Freelance is well integrated with other SmartSuite applications and with Lotus Notes, making co-operative production and network presentation a relatively straightforward endeavour.

Above Unlike ordinary templates, Smartmasters can be content-based. You can select a Smartmaster page for each element of your presentation, from the introduction to the summary

Right The Freelance interface is much better than it used to be. The page tabs are a nice touch, but the range of transition effects is less than expansive

PCW Summary

Price £350 (plus VAT)

Contact Lotus 01784 445908

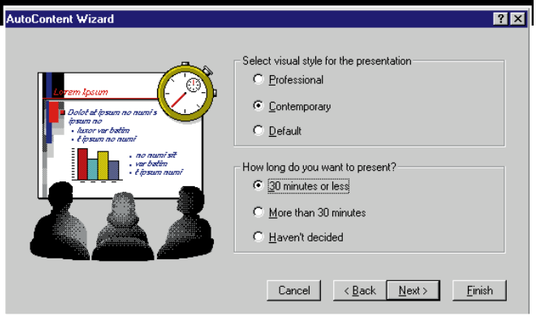
Good Points Integration with Notes and other SmartSuite applications.

Bad Points Poor selection of transitions and builds.

Conclusion Much improved, but still not in the top class.

★★★

MS PowerPoint 7 for Windows 95



Microsoft has always got it right with PowerPoint. Successive releases of what has come to be regarded as the presentations department of MS Office have always managed to strike the right balance between ease of use and feature enhancement. Version 7 for Windows 95 takes full advantage of the 32-bit environment, provides better online help in the form of answer wizards, and adds many new features and effects.

For all that, this version will be familiar to PowerPoint 4 users. The slide window, in which individual slides are created, sports a similar toolbar layout with text and object-editing ribbons. A new animation effects button produces a button bar which allows you to apply build effects to text and objects at a click. PowerPoint provides an excellent range of build effects: methods of introducing elements onto slides in a more interesting way than having them appear out of nowhere. The buttons allow you to apply a build effect with associated default specifications, including the type of effect, the order in which points are built (whether they appear as a paragraph a word, or one letter at a time), associated sounds and so on. The last button

PowerPoint's AutoContent wizards make setting up templates easy

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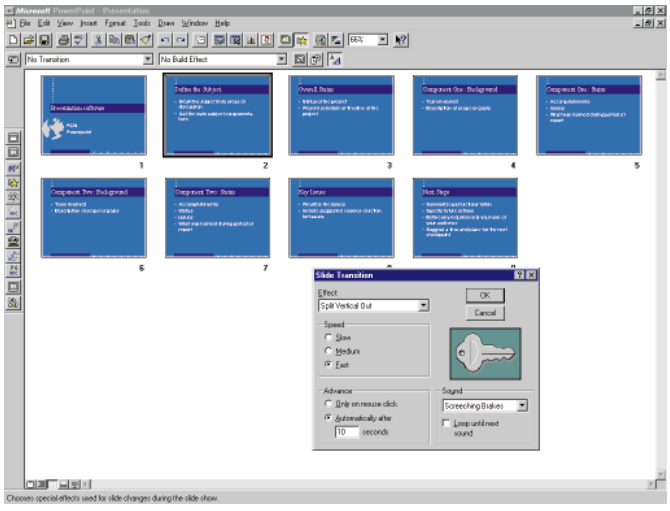


You can preview PowerPoint's extensive range of transition effects in the Slide Sourcer view

on the bar pulls up the animations settings panel which gives you more control over these settings. The slide transition dialogue offers a similar degree of flexibility.

Other worthwhile new additions include presentation conferencing, meeting support, and a slide meter which keeps an eye on the clock during your presentation and lets you know whether you need to pick up the pace or drop down a gear. The Meeting Minder allows you to take notes and minutes, and prepare an action list which can either be added to your slide notes or exported to Word. Conferencing allows you to present to an audience on a network or participate in someone else's network presentation.

There's full OLE support, and embedding Word tables and Excel worksheets is no trouble, as is creating graphs with version 5 of Graph (supplied). Organisation chart and Word Art (two additional apps which were included with Powerpoint 4) seem to have disappeared though, which is a shame.

PCW Summary

Price £269 (plus VAT)

Contact Microsoft 0345 002000; www.microsoft.com

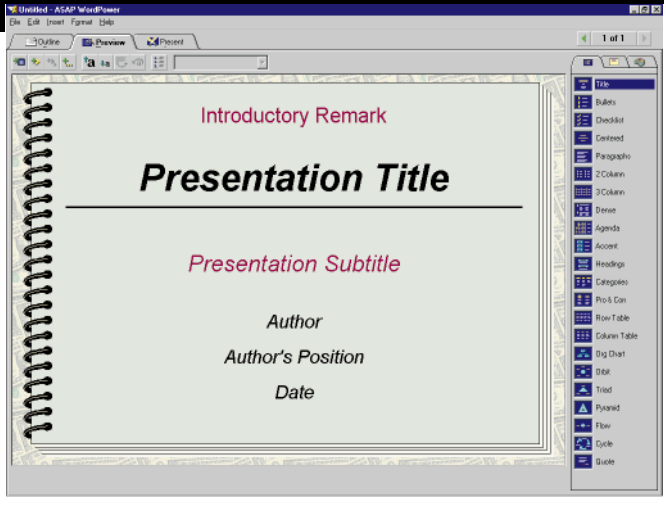
Good Points Office compatibility. Good transition and build effects. Easy to use.

Bad Points Full install requires 30Mb disk space. Slow with less than 16Mb RAM.

Conclusion For creating impressive presentations at breakneck speed, you'll be hard-pushed to find anything better.

★★★

SPC ASAP WordPower



Although it's by no means the cheapest presentation software you can buy, at £79 ASAP is in the budget category. You certainly won't go into disk space overdraft: the three-disk install uses less than 3Mb. Version 1.95 offers all the advantages you'd expect from a 32-bit application, including OLE drag-and-drop support, long filenames and, of course, faster operation. New features include transition effects and a wide choice of templates, extended by using them in combination with designs and colour schemes.

"With 22 layouts, 14 designs and 18 colour schemes, you have over 5,000 great-looking combinations" runs the blurb, which is like saying "if you have five shirts, two jackets, three pairs of trousers, six pairs of socks and a dozen pairs of underpants, you have over 2,000 stunning outfits".

The ASAP WordPower unique selling point is "Intelligent formatting". By choosing different "Intelligent Layouts", designs and colour schemes, even the aesthetically challenged can produce great-looking presentations in minutes, with hardly any effort — that is, if the hype is to be believed.

The thing is, it actually works. Rather than the Harvard approach of supplying advice at every opportunity on how to make the most of a powerful and flexible application, ASAP simply won't let you do anything that doesn't work visually. For the power users, this kind of constraint will be intolerable, but for the mere mortals who just want to knock together something workable inside half an hour, this is a godsend.

The interface is simplicity itself. Three tabbed panels toggle between preview mode — showing the current slide and an outliner — and running the display proper. Three tabbed lists on the right provide a choice of layouts, designs and colour schemes. First, you choose your layout, then pick a suitable design and colour scheme. In practice you're likely (or at least, be well advised) to stick with the same design and colour scheme throughout a presentation.

ASAP intelligently interprets what to do when you overwrite existing template elements with your own copy. So, if you pour in a heap of items on a bulleted list, it reduces everything to accommodate them. Likewise, if your org chart needs 15 boxes on the second level, each time you add one, everything else shrinks to fit.

The ASAP interface is about as simple as it gets. The layout list on the right has templates for titles, bulleted list, tables and charts

It's not powerful or sophisticated; it is quick, simple and effective. If you can't produce a decent presentation using ASAP WordPower, maybe you should go back to using flipcharts.

PCW Summary

Price £79 (plus VAT)

Contact SPC 0800 136932

Good Points Quick, simple and effective.

Bad Points Inflexible.

Conclusion Invaluable for the inexperienced.

★★★★

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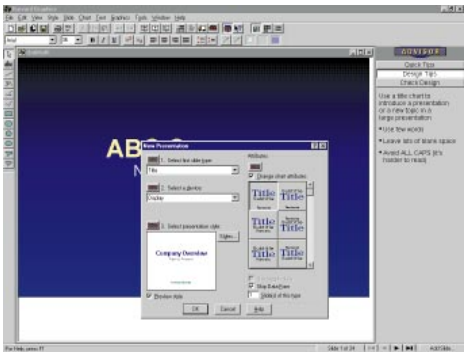
SPC Harvard Graphics 4.0

Harvard Graphics 4 builds on the solid foundation that was Harvard Graphics 3. The new version makes the most of the performance advantages of Windows 95, as well as adding a number of new features. Text editing has been improved with the addition of a find-and-replace option and the ability to lead type. A navigation panel provides greater control during on-screen presentations, audience handouts can be panel numbered and the clipart manager has been upgraded. Many more menu options have been given their own button on the tool ribbon.

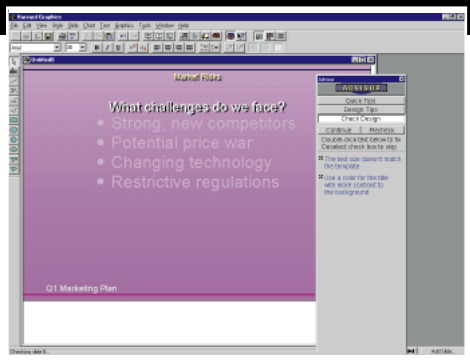
Two things stand out about Harvard Graphics: the design quality of the templates supplied, and the depth of online help available. The new presentation dialogue allows you to specify a style for each slide you add to a presentation. Clicking on advice buttons next to each selection provides some options, together with a brief explanation as to what they are best suited for.

If you are in a real hurry, though, you'll need quick presentations: an entire set of templates which includes a title sheet, bulleted lists, charts and so on for a range of presentation scenarios, from quarterly sales results to brainstorming sessions

These templates are, of course, just a starting point, and



The new presentations dialogue box lets you choose a presentation style and attributes for each style. The little buttons give helpful advice



The Advisor provides style and procedural tips, and will check your efforts for any major design gaffs

Harvard provides plenty of advice on how to mould them to your precise needs. The Advisor (a panel to the right of the slide screen) provides three kinds of help. Quick Tips give advice on procedural matters: how to overwrite bulleted text points or change a graduated fill. Design Tips warns you against doing things like putting white text on a light-yellow background or, heaven forbid, green on purple. Lastly, you can run a design check which will cast a critical eye over your efforts and recommend changes.

Harvard does reasonably well in the bells and whistles department, although like Lotus Freelance it's not in the PowerPoint class when it comes to transitions and build effects. Multimedia support hasn't improved much on version 3: sounds is easy, but animation and movies require a little more effort.

For producing stylish-looking presentations quickly and easily, this is it.

PCW Summary

Price £249 (plus VAT)

Contact SPC 0800 136932

Good Points Stylish templates. Superb online help with both procedural and design matters.

Bad Points Lack of integration with popular Office suites.

Conclusion Tops for ease of use and quality of templates.

★★★★★

Editor's Choice

There's not one bad product among the four presentation packages we chose for this mini round-up. All are capable of producing excellent on-screen presentations, all offer different features and, depending on your level of Windows and design-related expertise, some will make the experience of putting together a presentation much easier — you might even enjoy it.

Microsoft PowerPoint is undoubtedly the best equipped and most sophisticated of the four. It has a lot going for it: a superb range of flexible transition and build effects, good graphics tools, integration with Word and Excel, and good rehearsal and ancillary features like presentation handouts and speaker's notes.

Likewise, Lotus Freelance Graphics makes sense to those already using SmartSuite and Notes, although that's not the only justification. Freelance, like PowerPoint, also has excellent network support, allowing both collaborative working and conference presentation of finished projects.

The Editor's Choice this time around goes to SPC, primarily for Harvard Graphics. Anyone who has ever had to produce a presentation will be familiar with the sensation of cold sweat on the back of the neck as the deadline closes in and the figures, let alone the presentation, haven't yet been produced. Because you never have enough time, ease of use and sound help with elementary design aspects are more use than all the fades, swipes, dissolves and speeding bullets in the world. Harvard provides exactly the right kind of aid at every stage of the process, whether it's choosing colours for a graduated tint background or selecting the right size of type for an introductory screen. If you think this isn't important, try maintaining your sense of humour when your red text on blue background slides are unreadable when printed on a mono laser printer —it's particularly unamusing when you've had 500 sets photocopied and bound.

An honourable mention must go to ASAP WordPower. With ten minutes' training, absolutely anyone could produce something worthwhile using this software.

Design counsel

If you want to make a fast and easy buck, don't go into multimedia development. Adele Dyer discovers what a pricey and painstaking process it is.

I could do that, you think, as you play your latest CD-ROM. All I need is a copy of Director and, after a few evenings in, I'll be the next multimedia mogul.

If only it were that simple. The most striking thing about CD-ROM development is the staggering costs involved. Nick Croydon, joint managing director of Flagtower, says: "Each product costs about £500,000 to make, and after distribution, retail and packaging costs we get about £10 to £11 per unit. So you are looking at about 50,000 units to break even on your production costs — and that's pre-marketing."

Before you start spending that sort of money, you have got to be sure you are not developing a dead duck. Many publishers make short mock-ups of potential products to see how they will actually work and, more importantly, to see if there is a realistic target audience out there. Flagtower says they will tentatively develop demos of up to ten ideas for every CD they finally publish. Each cost about £500 to make, but this still represents a good investment compared to the final product.

Ideas earmarked for development must have a large target audience, so the brief handed to the producer at this stage will include details of the target audience as well as an outline of the subject matter. At Flagtower, the project leaders — an interactive designer, a graphic designer, a picture editor, a multimedia editor and the producer — get together to plan the look and feel of the CD, considering the design and the content structure. They draw up a flowchart specifying the areas they are going to research, how it will all be structured, what the main sections are going to include and what the off-shoots should be from these. This takes about a month.

Out of a nine-month development cycle, Flagtower looks to spend about three months on research. Despite this, the research period is necessarily limited if you are to stay on track for your deadline. Tamara Anghie of Flagtower, producer of The Unexplained, says: "We are constantly aware of trying to keep things to schedule, but still keep quality as well. We have never been in the position where we can say, let's stop things now and extend our research period. You reach a point where you can't do any more."

Choosing a design for a CD is as much a matter of house style as of the designer's own preference. You only have to look at the Dorling-Kindersley titles to realise how rigorously they follow a set, menu-driven design structure. By contrast, Notting Hill has used virtual reality worlds for its CDs, which the MD, Andreas Whittam Smith, describes as a calculated risk: "The least risky way of doing a title is to make it look like a book on-screen. A slightly more risky way is the way we have gone. We take buildings and allow people to intuitively find their way around. I won't say it's dramatic, we won't get the VC for it, but it is a bit different."

No matter how wonderful the design, you can't skimp on the content. Many CD-ROM publishers are part of much larger media conglomerates and can source their material from articles already owned by their organisation. The likes of News International can create a title like Makers of the 20th Century from its archives at the *Times* and the *Sun*. Smaller publishers, however, often use specialist writers to create a title. Notting Hill is shortly to produce a CD with geneticist Richard Dawkins. Freelance writers are often used to knock the background information into shape.

From this point, the long process of picture research starts, which is neither easy nor cheap. Flagtower calculates it uses between 1,500 and 3,500 photographs on each of its titles, budgeting £40 for each, as well as often paying a small viewing fee before deciding to use them. Flagtower expects to pay around £15 for every second of film footage it uses.

The question of copyright rears its ugly head at every turn. Forget the interactive designers, programmers and producers. The one person no CD-ROM developer can

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Above Editing onto a time-coded VHS tape so that a soundtrack can be composed to fit
Right Part of the design process at Flagtower

do without is a good lawyer. Illegal use of a copyrighted picture could land you with an injunction to stop sale of the product or force you to repress and rebox thousands of copies. One particularly tricky area is if the supplier does not actually hold the copyright to it, and is in fact supplying you with a court case waiting to happen.

Once all the elements are in place, the images have been sourced and the text has been written, a final storyboard is drawn up. This combines all the elements and decides which picture should go with which piece of text or which sequence of narrative. The interactive designers decide on the final structure and how the interaction between parts of the CD will work, including details such as the hierarchy of programs and where the return passes are going to go.

Once the storyboard has been passed by the legal team, the work starts in earnest. The graphics team of designers, animators and interactive designers move in, and a voiceover artist records a base tape of the narrative, so the team has a time frame into which to fit the scenes.

The team working on each product can be quite large. The larger companies have a structure similar to a TV company, with a producer, assistant producer and possibly a production assistant. When Flagtower was developing The Unexplained, it used all of these, plus one picture editor and two picture researchers. The core graphics team consisted of four designers and one integrator, but at one point they drafted in an extra five designers and an extra integrator. The company has a staff of about 100 to draw on, including around 30 designers, so drafting in extra people can be done by just shifting the workforce from one project to another. Notting Hill has a much smaller permanent workforce of just four designers and three programmers, and uses freelancers as necessary, so its structure is necessarily simplified.

At this stage a composer is commissioned, but he or she can only rough out a few ideas. The track cannot be finalised and recorded until each section has been completed by the designers, mastered in Premiere and transferred onto a time-coded VHS tape. It would be a shame to compose a stirring anthem and then discover it had to be cut short because it was 30 seconds too long. Tamara Anghie explains how this worked on The Unexplained: “Because each of the sections of The Unexplained were individually scored, we decided we had to score the music to the picture. The composer came up with various themes, but to get down to the nitty-gritty involved working specifically to a time-coded picture. So we had to lay off pictures from the computer onto a video tape for him to work to.”

The designers have to work to strict guidelines. Not only is time a constraint, but the style has to be carefully monitored. Tamara Anghie points out: “You can have a beautiful graphically-designed section, but one which has no relevance to what is being discussed.”

Before the designers set mouse to Photoshop, the art director will have settled on the basics of how the CD should look. As in the magazine industry, font sizes and type faces have to be regulated to make the whole look consistent. Colour schemes are often used to suggest to the user where they are and to aid navigation.

No matter how strict the brief, it does not mean two products have to look the same. Tony Sobers, art director at Flagtower, says: “Nothing is decided until we see what the content is, not until we see where the program is going, what the focus of it is. At that stage, we will pull background imagery out of it, pull icon ideas

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post-production multimedia editors take the various elements (audio, graphics and video), create an AV sequence in Premiere and transfer it onto VHS using VideoVision boards for approval by whoever has commissioned the work. The reason for this is convenience, as the work is not in a state to be viewed on a PC.

Once it has been approved by all parties, including the lawyers, the software integration begins. A suite of programs is needed to deconstruct the various elements and put them back together again in PC format, making sure the database of links is correctly configured. Timing is all-important. An important aspect of software integration is making sure the program will play the same no matter what the machine, so if you are running it on a 486, the music, video and pictures will still come in at the right time.

Alpha testing then starts. This involves ensuring the display effects are right, the new graphics appear over the old, the wipes and dissolves are functioning, and making sure the QuickTime movies run correctly.

When all the problems have been sorted out, the final narrative track be recorded. If you opt for a famous voice to do the recording, you have to get it done in a single session. It is expensive to do more, but more importantly, it is often impossible to get back a celebrity for a second, unplanned session as they are likely to be busy with other engagements. If you are not using the same voiceover artist as on the guidetrack, there are certain difficulties, as Tamara Anghie explains: "You can allow for different intonation, but you have to keep the pace pretty tight. There is very sophisticated editing equipment nowadays and you can take out breaths and gaps to make it fit."

You are finally ready to try it on the outside world. Flagtower brings in members of the public to look at any new product. They are given a list of things to find, and also some time to just move about and look at whatever they want. Flagtower then asks them questions about what they have seen. Not much can be altered at this stage, but if the testers find navigation difficult at one point, it might be possible to change a graphic to make it more obvious what button they need to push next. The advantage of this is to find ideas to improve future products.

All this, of course, is the easy bit. You then have to try packaging it, marketing it, distributing it, selling it and, most of all, recouping the thousands of pounds you have spent so far. ■

Above Finally, sound-editing takes place. Sophisticated editing equipment can add and remove gaps and breaths Below Andreas Whittam Smith, Tony Sobers and Tamara Anghie

out of it. The functionality is dictated partly by the content, partly by the engine, but no two titles will look the same."

Most developers use Macs and a basic raft of the expected products: Photoshop, Illustrator, Director, Premiere and QuickTime. The layers in Photoshop are used extensively by many developers. A single Photoshop file can be used for a sequence lasting one or two minutes on the finished CD. Director is still a favourite for knocking together interface ideas quickly, although for time-based development it could be better.

QuickTime comes in for a real slating from all sides. Tony Sobers says: "You never know which of your ten clips are going to run smoothly. Lots of tools are needed just to get it working. Once we have reached a final testing stage, most of our time is spent tweaking it to make it run. You are constantly trying to work out why it won't work. There are so many things that will make a QT movie run well on one machine and badly on another. We have to do it by trial and error." Using AVI files instead is not yet an option, as there are not the same range of tools on the market for tweaking the files to do everything you need.

Other processes are painstakingly slow. DeBabeliser is regarded as a great post-production tool if occasionally a little unrefined. The package standardises palettes among batches of files, reducing them to a standard number of colours. It works by looking at files one after the other, and deciding on the best palette for each one individually. It then compares the results of all of them and decides on the best palette for all. Finally, it goes back and applies the optimised palette to each file in turn. To save time, it is best to set it running overnight, but if it crashes you are delayed the next day.

Once the basic design is over and the scenes have been put together by the interactive designers, the

Group Test Inkjet Printers

Colour scheme

Any inkjet as long as it's colour: they're affordable, and the technology is making great strides forward. Here we put eighteen printers to the test.

Once king of the mountain and the forefather to the colour inkjet, the mono inkjet printer is dead — this year's group test confirms it. Now colour printing is the norm, whether it involves a swappable, three-colour cartridge unit or an all-in-one four-colour printer. Whether you like it or not, colour is here to stay. The only question that remains is, what direction is the technology moving in?

Here we take a look at the bulk of colour inkjet printers available, new and old, to see how they all compare. From nine market players, leaders and followers, we've rounded up eighteen colour inkjets that cost less than £500. What we got was a cross-section of the latest and greatest, including the just-released Canons and Hewlett-Packards, to the worst you could possibly want.

All the printers in this test are strictly inkjets, except the dry-ink Citizen Printiva. Leaving out thermal wax, dye-sublimation and colour laser technologies allows us to compare like with like across a whole range of features. You'll find that almost all the printers reviewed here have similar features, particularly in their driver options such as colour control and medium selection, so we focused our tests on what the printers can do. How fast are they at printing full pages of text? What about their ability to print large, complicated image files? And, of course, how good is the print output?

Of course, no group test would be complete without an examination of the actual technology of the inkjets themselves. The design and manufacture of the inkjet print cartridge is more like mini-rocket technology from NASA than one would believe. Gone are the days of the loud, speedy and rotating head of the daisywheel or, for that matter, the buzzing head of a dot-matrix printer. On page 138, Eleanor Turton-Hill gives you the background.

Lastly, we look at what is behind inkjet technology and where it is going. With the advent of digital cameras and powerful home PCs, and high-quality paper readily available and reasonably affordable, it may not be long before we can print our holiday photos at home, not through our local photo shop. One of our participants, Canon, appears to have set its sights firmly in this direction.

So if you're in the market for a new printer, for the home or the office, than read on and see what the keen eyes of the *PCW* team found with this year's wave of colour inkjets.

p125 ➢

INKJET PRINTER Photography by David Whyte, IMAGE Tony Stone

Inkjet Printers: Contents

Contributors: Dylan Armbrust, Adele Dyer, Eleanor Turton-Hill

Canon BJC 240

Personal Computer World Highly Commended

The BJC 240 is the first of three new models launched by Canon this autumn, each making use of a new "photo-real" ink technology. It uses a three-colour, CMY cartridge which can be swapped for a dedicated black cartridge when you want to print straight text.

The BJC 240 is a small printer with a footprint of 347mm x 208mm x 176mm. There's an upright, rear paper feed with 100-sheet capacity and the paper is ejected out the front, but no output tray exists so the sheets fall right on to your desk.

The BJC 240 is completely plug-and-play, and Canon provides ample documentation to guide you through the setup and run process. All functionality is software-driven so there are no coded arrays of lights to decipher if there's a problem. The drivers provide bi-directional feedback and the user can control all aspects of printing, but it's best to rely on Canon's auto-configuration feature that will select the best settings according to your print job. If it thinks your settings are incorrect, it will tell you and fix them, but you can override this if need be.

The photo-real capability is impressive, but you need to switch to the photo-ink cartridges to make use of it. The end result is impressive but printing can be slow, especially if you have a large image file. Mono text output is average but could be more dark, and the BJC 240 manages about 2ppm for a full page of text.

PCW Summary

Price £169 (expected price; plus VAT)
Contact Canon 0121 680 8062
Good Points Compact, easy to use. Excellent colour output.
Bad Points Slow colour printing. Black text could be darker.
Conclusion Good for home printing, especially if you plan on moving to digital camera use.
★★★★

Canon BJC 4200

The BJC 4200 is the next step up in Canon's new line, but is a four-colour CMYK printer aimed at the high-end home user or SoHo business needing quality colour print output. It, too, has the photo-real feature and it makes the best of it. Using the *PCW* team in a blind comparative test, we found they chose the BJC-4200's photo image over the rest each time. It may have taken 28 minutes to print, but the result was worth it.

It isn't slow on all colour printing, as it finished the CorelDraw test in good time. The colour output was good and there was no banding present. It handled the fine detail of printing well, since the BJC 4200 was only one of a handful of printers in the group to be able to print a white hairline through solid black with no bleed. Print resolution comes in 360 or 720 dpi, hence the excellent photo printout, but there is no ink-saving mode to allow a quick draft printout. The text output was similar to that of the BJC 240 and the other driver features are also identical. Paper can be fed through the rear via an upright sheet feeder or, for a thicker medium like glossy paper or envelopes, manually. Oddly, the BJC 4200 requires an external A/C adapter instead of having the standard kettle cord plug-in. This doesn't, however, detract from the overall design of the BJC 4200. With its attractive, non-shoebox like shape, moderate desktop footprint and easy access to the interior, you can see that some thought has gone into its build.

PCW Summary

Price £249 (expected price; plus VAT)
Contact Canon 0121 680 8062
Good Points Photo-real printing impresses, especially on glossy.
Bad Points Slow handling large image files compared to the group.
Conclusion A worthy printer that delivers what it says.
★★★★

Canon BJC 4550

Canon completes its autumn trio with the BJC 4550 four-colour, large format printer. It differs from the other two new Canons only in what it can handle, which is any medium from index cards to plain paper to A3 glossy paper for poster-size reproduction. It uses the same Canon print engine and also produces similar text and colour quality, both with standard and photo-ink cartridges. Best quality is achieved, naturally, on Canon's proprietary glossy paper, but its plain paper output doesn't disappoint.

Like the other Canons in the test it supports 360 and 720 dpi high-resolution printing. Paper feeds in through the rear sheet feeder and there's no need to manually feed thicker mediums, like transparencies and glossy paper, unless you choose to. With the inclusion of an RS422 serial port option, Canon has aimed this printer squarely at the business market. Drivers for Windows 95, 3.1x, DOS and Mac operating systems are included in the box. Support for Windows NT and OS/2 is optional.

No cartridge swapping is necessary, but if you plan on printing a lot of text it's best to use Canon's mono ink cartridge. Canon has bundled its own Colour Desk software, for all three new printers, including 50 TrueType fonts.

Again, the only disappointment is the speed at which the BJC 4550 completed our tests — 2 pages per minute for text and 28 minutes for the photo image pale in comparison to the new Hewlett-Packard printer results.

PCW Summary

Price £450 (expected price; plus VAT)
Contact Canon 0121 680 8062
Good Points Handles A3 paper. Three-year warranty.
Bad Points Same as the other Canons, just a bit slow.
Conclusion Forgive the speed and you get a good product.
★★★★

p126 ➢

Citizen ProJet IIC

The ProJet IIC has to be the grandaddy of the bunch, and is showing its age. A three-colour, swappable cartridge system exists, so if you want to print straight text you have to change to a black cartridge. We had some painful moments using the ProJet IIC, most emanating from the driver software. We couldn't classify it as plug-and-play as Windows 95 didn't recognise it on startup. Citizen has issued a new Windows 95 driver but, sadly, it comes up short. The printer wouldn't print using the black cartridge, try as we might, until we switched to the Windows 95 generic ProJet II mono driver. It did recognise the black cartridge when we loaded the recommended HP DeskJet 500C driver, which the ProJet IIC emulates, but printing was twice as slow for black text and colour output was appalling.

The ProJet IIC has a series of switches for DOS printing and two lights that flash various error messages when trouble occurs. Without the manual you'll have trouble deciphering either the switch settings or the error messages, but luckily the documentation is pretty good.

The best print resolution, in mono or colour, is 300 x 300dpi with quality being below par. Paper is fed from the rear and outputs, upright, on the top. We liked this, as it made the printer seem more compact.

PCW Summary

Price RRP £279 (plus VAT)
Contact Citizen 01753 584111
Good Points Upright paper output. Provides historical entertainment value.
Bad Points Bad drivers. Complicated error message system. Overpriced.
Conclusion Time for retirement.
★★

Citizen Printiva 600c

The Printiva 600c is remarkable. It is the only printer in this test to use dry ink technology, so instead of using cartridges full of liquid ink, it has four tapes which look just like audio cassette tapes but are smaller and wider.

The cyan, magenta, yellow and black cassettes rest in the door of the printer and are individually picked up by the print-head as needed. The process is multi-pass as the printer puts on one colour, sucks back the paper and lays the next colour on top. On the full-colour images this meant passing the paper through four times, but the speed was still good. The first pass is the longest, as the printer decides where to put each dot, but subsequent passes are much faster.

Printing was very precise: the Printiva was one of the few to successfully print the hairline on the Corel test. The colours were strong, there was no banding and the paper did not crinkle, but the overall effect was a little clinical.

The advantage of this printer is its versatility: it's a good all-round performer. It doesn't use its own high-resolution paper — any generic inkjet paper will give good results, and it will print on card, transfers and (flattened) boxes.

There are even metallic magenta and cyan cassettes. The metallic cyan is a pretty blue/grey colour, but the magenta is rather strident and will not be to everyone's taste.

PCW Summary

Price £439 (plus VAT)
Contact Citizen 01753 584111
Good Points Highly accurate printing.
Bad Points A little lacking in vibrancy.
Conclusion Pricey, but a good all-round printer.
★★★★

Epson Stylus Color IIS

At £197, the Stylus Color IIS is one of the cheaper printers in this group test. It's also one of the slowest: it posted times slightly faster than the Integrex, one of the worst of the group. With an average print time of 80 seconds per page of text, one could be waiting for output for some time. One expects better from Epson, even with a model which, like this one, has been around for a while.

The Stylus Color IIS is a swappable, single-cartridge, three-colour printer. The driver options are similar to the other Epsons in the group, allowing full medium selection, contrast, dithering, halftoning and resolution control. It can produce documents in 180, 360 or 720 dpi, which is very respectable. With the flick of a lever it can easily handle various paper thicknesses, but problems were found with the paper eject where printed sheets wouldn't fully come out until the following sheet gave it a nudge. The print quality was acceptable on both the colour and mono print tests but doesn't rank in the top five. Text edging showed a bit of jaggedness at 300dpi (normal setting) and its printing of CMY composite black was a bit light. The photo image printout was okay but lacked sharpness and detail, and erred a bit on the yellow side of flesh-tone colour.

The Stylus Color IIS is probably a good match for the home user who has minimal needs and expectations, but for business users it won't make the grade.

PCW Summary

Price RRP £197 (plus VAT)
Contact Epson 01442 61144
Good Points Fair quality, good price.
Bad Points Slow on both colour and mono printing.
Conclusion Cheap, and good for the home user with average expectations.
★★★

p130 ➢

Epson Stylus Color 500

The Epson Stylus Color 500, at £291, is firmly in the middle of the pack. The same is true of its performance. Its scores in the text, CorelDraw and Photoshop tests were all middling, but this isn't a bad thing, especially if you're not looking for the best and brightest but just a reliable printer.

This dual-cartridge, four-colour printer utilises Epson's piezo electric technology which offers improved speed and output quality over conventional inkjet technology. Print output ranges from 180dpi for draft output to a dense 720dpi for generating high-quality presentation and photo images. Printer functionality is controlled through the driver which controls print-head calibration, contrast, colour balance, media selection, high-speed and microweave options. The Epson's bi-directional feedback is displayed in its status screen, showing print job activity, with pause, stop and reprint options a mouse click away.

Paper is fed from the upright rear input tray and outputs to the front, but sheets weren't always ejected properly and would stick in the rollers until the next sheet pushed them out. In terms of output quality, our mono text printing test found the Epson half as fast as its claimed 4ppm, but the text itself was clear. Colour output was good, especially at 720dpi, but the CorelDraw test showed a slight weakness on the colour red which came up more orange than the others.

PCW Summary

Price RRP £291 (plus VAT)
Contact Epson 01442 61144
Good Points Reliable and easy to use.
Bad Points Paper feed problems. Red colour slightly off.
Conclusion Not the best and not the worst — a perfect Joe Bloggs printer.
★★★

Epson Stylus Pro

This four-colour CMYK printer was the most expensive of the Epson printers we looked at. Unless you're a high-end home user you won't really be able to make the best of the Stylus Pro: it's primarily meant for SoHo or repro-house proof work.

The Stylus Pro's footprint, with paper-out tray fully extended, comes close to 670mm x 470mm. Epson bundles Windows 95, Windows 3.1x and DOS drivers with a Windows NT option, but you're out of luck if you use OS/2. Its business orientation is apparent by the fact that it has both PostScript 1 and 2 page description languages plus serial and Ethernet connector options. This combination makes it fully network capable. The paper feeds through a forward-facing lower tray, while output loops through and comes out on the upper tray. The Stylus Pro can accommodate a variety of mediums ranging from A4 paper down to small envelopes.

The drivers and bi-directional feedback status screens are almost identical to the other Epsons in the group, except for ink cartridge fill status. The control panel consists of six buttons providing a combination of functions like font selection and print and colour options. Output goes from 180 to 720 dpi. Colour output was respectable, but it had initial problems printing the edges of the photo image. However, it did manage to print the white hairline through 100% black — impressive for an inkjet.

PCW Summary

Price RRP £436 (plus VAT)
Contact Epson 01442 61144
Good Points Can cope with fine hairline printing.
Bad Points Photo image a bit yellow and banded on the edges.
Conclusion It does the job. With adjustment, it should prove satisfactory.
★★★

Hewlett-Packard DeskJet 660C

This is probably the last time you'll see the DeskJet 660C reviewed, as it is rumoured that Hewlett-Packard may soon be discontinuing this line. But that shouldn't dissuade one from taking a look at this old war horse.

The DeskJet, a dual-cartridge CMYK printer, still managed to hold its own in our tests. It didn't meet HP's claimed spec of 3ppm on mono text, but it did manage 2ppm. On our colour tests we found there was some banding, both on the photo and the CorelDraw images. Also, the photo image did lack a lot of fine detail when compared to the others. Nonetheless, its resolution ranges from 300 to 600 dpi.

Paper is fed and output through two front-facing trays, like most other HP models. The 660C's footprint is a moderate 199mm x 436mm x 405mm and shouldn't take up too much desk space, especially if used at home. Its drivers provide lots of options, allowing the user to modify settings when necessary.

Hewlett-Packard has given the 660C much more latitude in terms of what operating systems it works with compared to the other HPs in the group. It not only has drivers for Windows 95, Windows 3.1x and DOS, but there's also one for OS/2. Plu,s there are 35 scaleable fonts and HP's PCL3 emulation should you stray from the path of Windows TrueType.

PCW Summary

Price RRP £294 (plus VAT)
Contact HP 0990 474747
Good Points Quick, but not the fastest, colour printing.
Bad Points Banding in some dense images.
Conclusion Meant for the home and worth owning, but wait for the price to drop.
★★★

Hewlett-Packard DeskJet 820Cxi Professional Series

The 820Cxi is one of two new additions to the DeskJet line. At first glance it seems boxy and inelegant, but look deeper and you find a quality printer. It's a four-colour printer with the option of using a single black cartridge for large text-printing jobs.

Text printing averaged HP's stated 4ppm, while its handling of our CorelDraw test didn't disappoint with its time of 7.44 minutes to print. Unfortunately, it let the side down with its time, 17.52 minutes, to print the Photoshop image. Nonetheless, the print quality was excellent. No banding or fuzziness was found and the text output was dark and crisp.

The 820Cxi is fully plug-and-play and the driver provided gives the user lots of flexibility. One can control halftoning, print quality (draft, photo, presentation, etc.) and medium selection. However, HP's media selection menu is limited to the company's own paper products save for plain paper, but this practice isn't limited to HP alone.

The paper trays are forward facing with input on the bottom and output on the top. It also has a manual feed option for special print jobs, like transparencies or single envelopes, but it will print out a stack of envelopes if required. The 820Cxi has its own PCL4 emulation plus a bonus 50 TrueType fonts, but no fun extra software like that of Lexmark's.

PCW Summary

Price RRP £354 (plus VAT)
Contact Hewlett-Packard 0990 474747
Good Points Vivid colour output. Respectable text print speed.
Bad Points Photo image printout time a bit longer than expected.
Conclusion A quality printer. It's easy to forgive its weaknesses.
★★★★

Hewlett-Packard DeskJet 870Cxi Professional Series

Personal Computer World Editors Choice

HP has produced one of the most impressive printers of the group. Not only was it the fastest printer in almost all of the tests, its print quality was outstanding too. On our CorelDraw test the colour rendering was pure and vibrant, with the red, green and magenta almost leaping from the page. The photo image was clear, focused and fairly accurate.

HP has managed to achieve this with its four-colour, CMYK cartridge setup. No need for swapping black and colour cartridges as all are included on one, easy-to-install unit. The new 870Cxi can print from 300 x 300dpi to 600 x 600dpi and it shows in its output. Setup and installation was a breeze and the driver provides for a good range of options. The user can choose the auto setting for trouble-free printing or use its ColourSmart custom controls for adjusting contrast, halftones, dithering, output quality and printing options such as twin-sided printing.

The 870Cxi's footprint, at 226mm x 444mm x 396mm, isn't small. Paper feed is accomplished through two front-facing trays: input on the bottom, output on top. HP includes drivers for DOS, Win 95 and 3.1x, but not OS/2 or Win NT. With 512Kb RAM on board it was no surprise it reamed off just under 6ppm on our text printer test. The 870Cxi also has PCL5 emulation and 26 scaleable fonts plus 50 extra TrueType fonts.

PCW Summary

Price RRP £420 (plus VAT)
Contact Hewlett-Packard 0990 474747
Good Points Great speed, great colour, and crisp text printing.
Bad Points None to speak of.
Conclusion Ideal for the office or big-spending home user.
★★★★★

Integrex BetaJet C

One look at the BetaJet C and the words "cheap" and "budget" spring to mind. At £129, it was the lowest-price printer in the group. But like they say, you get what you pay for, and for £129 you won't get very much.

The BetaJet C is a single CMY cartridge printer aimed at home use. To print text you'll need to swap a colour cartridge for a black. The printer engine technology is from Olivetti, as is the basic design, but don't expect similar quality. It performed abysmally on our mono text test, posting an outrageous 89.24 seconds per page. On the colour side it appears to be quick, but this is wholly deceptive. The BetaJet C wouldn't even print the photo image from the Photoshop test. It just managed to produce something from the CorelDraw test, but the colour grey ended up blue and we won't even tell you how the black looked.

Why? It all comes down to its driver. All we were given was a universal printer driver from 1992. After checking with Integrex, which confirmed this was the correct driver, we knew this printer was out of the race.

It's a compact printer — in fact, it's slightly larger than the portable HP DeskJet 340. Like the Citizen ProJet IIC and the Mannesmann Tally 7118C, it has a large series of manual switches to control fonts and print quality for those still operating in DOS. It also has HP DeskJet 500 emulation capability.

It doesn't come with a multiple sheet feeder (add £20 for this privilege), and the software colour adjustment options are almost none existent. Our advice: *caveat emptor*.

PCW Summary

Price £129 (direct; plus VAT)
Contact Integrex 01283 550880
Good Points Absolutely none.
Bad Points No speed, poor colour, no Windows 95 driver.
Conclusion Just plain bad. Don't touch it.
★

p134 ➢

Lexmark Color Jetprinter 1020

The 1020 is Lexmark's entry-level inkjet. From the outside it looks very much like the 2050 and the 2070 except that it has neither their huge paper trays nor a paper catch. Unlike the other Lexmarks, the 1020 is a single-cartridge printer with swap-in black or colour cartridges. The unwanted cartridge is stored in a small plastic holder which attaches to the side of the printer.

The setup routine is a piece of cake and the printer was in operation within a few minutes. The drivers offer almost the same range of facilities as its big brothers, the 2050 and the 2070: paper and print quality selectors, colour adjustment, halftoning, and cartridge control. The beauty of the drivers, however, lies not in the wide range of choices offered under each heading, but in their logical arrangement. It also has the best progress monitor of any printer we saw, which gives an accurate percentage breakdown of how far you have progressed through the printing stage.

The print quality produced was very good. Although on the *PCW* test page it failed to print the hairline correctly and when printing in the default mode produced some banding on the solid colour tests, this disappeared when we switched to presentation mode. However, it would not print at 600dpi on the PhotoShop test and defaulted to 300dpi.

The 1020 was easy to set up and operate, while the drivers made it a pleasure to use.

PCW Summary

Price £180 (plus VAT)
Contact Lexmark 01628 481500
Good Points Good price. Excellent drivers.
Bad Points Defaults to 300dpi on Photoshop test.
Conclusion A good all-round printer for the price.
★★★★

Lexmark 2050

The 2050 is the latest addition to the Lexmark stable and fits into the range just below the 2070. The 2050 is branded by Lexmark as a "family" printer while the 2070 is aimed at the SoHo (small office/home office) market. In its looks, the 2050 is essentially the same printer and has a paper tray of the same capacity (150 sheets), but it is more streamlined. The printer makes do with only one button, the "on" switch, and like its elder sibling it has two cartridges, CMY and black.

As with all the Lexmark printers it came with CorelDraw 3 and Lexmark Workshop (both on CD) and a mouse mat. A pack of US Letter-sized speciality papers is also part of the bargain, including iron-on transfers, labels, greeting cards and glossy paper (or photo paper, as Lexmark calls it).

As to quality and speed, the 2050 performs exactly as you might expect from its "family" class designation: although it's fast, it's not as fast as the 2070, but the print quality is almost as good. Like all the Lexmarks, it failed to distinguish the hairline on the Corel test, while the Photoshop test was sharp yet oddly coloured. Unlike most of the other printers here, the predominant colour was dark pink, rather than yellow. One new innovation with this printer is a super-sharp, waterproof, black ink, but we did not get a chance to test the new cartridge.

Personal Computer World Highly Commended

PCW Summary

Price £285 (plus VAT)
Contact 01628 481500
Good Points Versatile in how it uses media.
Bad Points Not as fast as you might expect.
Conclusion A good family printer.
★★★★

Lexmark Color Jetprinter 2070

The big brother of all the Lexmarks is this 2070, aimed at the SoHo market. It is similar to its smaller siblings in looks, and the same ColorFine 2 drivers were used on all the Lexmarks we saw, but as it's a two-cartridge printer the 2070's drivers also include an alignment routine to get the cartridges working in sync.

Unlike the other Lexmarks, the 2070 is not the most attractive of printers, and due to the paper trays is altogether quite large.

A clue to its power is the paper tray. This has the same 150-sheet capacity of the 2050 but looks as though it is built for heavy industrial output. The need for something like this becomes apparent as soon as you start to print. The paper is snatched through at such an alarming speed, and with such ferocity, that you fear you could lose a finger or two if you were allowed to get too close to the mechanism.

The results were equally impressive: it ripped through the text tests and then went on to shuffle off the Corel and PhotoShop tests in double-quick time. It did suffer a little from slight banding when printing solid colour, and it failed the hairline test, but the colours were vibrant.

On the PhotoShop test, the 2070 (as well as the 2050) was one of the few printers to produce pink flesh tones: all the others on test produced very yellow results, although the colours were a little dark.

PCW Summary

Price £375 (plus VAT)
Contact Lexmark 01628 481500
Good Points Fast. Good drivers.
Bad Points Slightly odd colours in the Photoshop test.
Conclusion Good for the SoHo market.
★★★★

p137 ➢

Oki OkiJet 2010

The OkiJet 2010 could be classified as the ultimate, four-colour Windows printer. There's very little assembly required for this solid, shoe-box looking printer. There is only one button and only one light — just to turn the printer on or off. All the necessary functionality, colour contrast, ink cartridge status and media selection is run by the printer's software via the bi-directional parallel port. If you like to watch percentage bars grow and animated pictures of printers printing, you'll love this.

The Oki is technically a plug-and-play printer which Windows 95 detected immediately, yet it wouldn't find the driver when we inserted the disk. After several attempts we used the back door method of "Add Printers" and "browse" and managed to successfully load the driver. From hereon, the printer gleefully went to work for us.

It managed to do quite well on our colour speed tests, returning a speedy 11.12 minutes in the Photoshop test. However, it did come up a bit slow on printing straight text, with an average of 40.31 seconds per page. Print quality can be classified as average. Text was legible and clear but lacked some of the sharpness demonstrated by other printers in its price range, and similarly in terms of colour print quality. The photo image test, although fast in terms of output, also seemed a bit less sharp but by no means could it be deemed sub-standard.

PCW Summary

Price £340 (plus VAT)
Contact Oki 01753 819819
Good Points Easy to use. Vibrant colour output. Fast colour printing.
Bad Points Slow on text printing. Sharpness lacking in printouts.
Conclusion An easy-to-use printer, but compared to others a bit over-priced for what it offers.
★★★

Olivetti JP 170SC

The Olivetti JP 170SC was something of a puzzle, and the reason for this probably comes down to its drivers. Although it can be either a monochrome or a colour printer, it is a single-cartridge device which requires different drivers depending on how it is being used. We had the colour version, and there was a note in the manual that if you wanted a monochrome print-head you would have to buy that separately. Although the printer is cheap, this seemed a little excessive.

Setup was easy. The cartridge slotted in easily and the drivers set up without problems. The purpose of the lights on the front did not become apparent, however. The drivers themselves were a little spartan and lacking in versatility overall. All the general controls were there, but the choices within each were somewhat limited compared to others in this group test.

The puzzle continued as we began the tests. The monochrome printing was painfully slow as the printer seemed to be working out how it was going to do each line. This may have been down to the colour drivers and the lack of a black cartridge. The colour printing, however, was fast and accurate. The Olivetti managed the hairline on the Corel test and the colours were good and bright, although they seemed a little grainy. The solid black test underlined the fact that there was no black cartridge, as you could clearly see red mixed in too great quantities at the start of the section. It would have been interesting to see how the JP 107SC reacted with a monochrome print-head for the text tests.

PCW Summary

Price £179 (plus VAT)
Contact 01206 505152
Good Points Accurate printing.
Bad Points Drivers lack versatility.
Conclusion Good printing in colour but slow in monochrome.
★★★

Tally 7118C

Once known as the Mannesmann Tally 7118C but now (under its new owners) called simply the Tally 7118C, it looks, feels and sounds exactly like the Citizen ProJet IIC. And as a result of this, it had almost the same problems as the ProJet IIC.

Regrettably, we couldn't find any Win 95 drivers in the box, or on the Tally web site, so we had to rely on the drivers of its identical twin. Unsurprisingly, it produced near identical results in the mono text test but astounded us with much faster results in its colour printouts, posting times that were almost twice as fast. But the Tally makes use of an Olivetti print engine instead of the Citizen, so this could be where the improvement lies.

Text print quality showed a bit of bleed around the edges and we found the same to be true (although in the colour red) of the CorelDraw test for the black-related test segments. With a maximum of 300dpi resolution, one wouldn'g expect great things from the Photoshop test, and, when compared to the newer group test participants, this was the case.

Paper is fed from a rear tray and is output to a clear, see-through, upright tray. This can be handy when monitoring what is happening with the paper feed while printing. Two gear-shift-like levers at the front control paper placement and alignment, which can be a bit confusing as there is no clear labelling on them. Tally also includes a nice cartridge holder to help prevent the print-head from drying out.

PCW Summary

Price £255 (plus VAT)
Contact Tally 01734 788711
Good Points Faster colour printing than the Citizen ProJet IIC, plus cartridge storage.
Bad Points Still an old model. Print quality lacking.
Conclusion Although a better deal than the ProJet IIC, you could do even better.
★★

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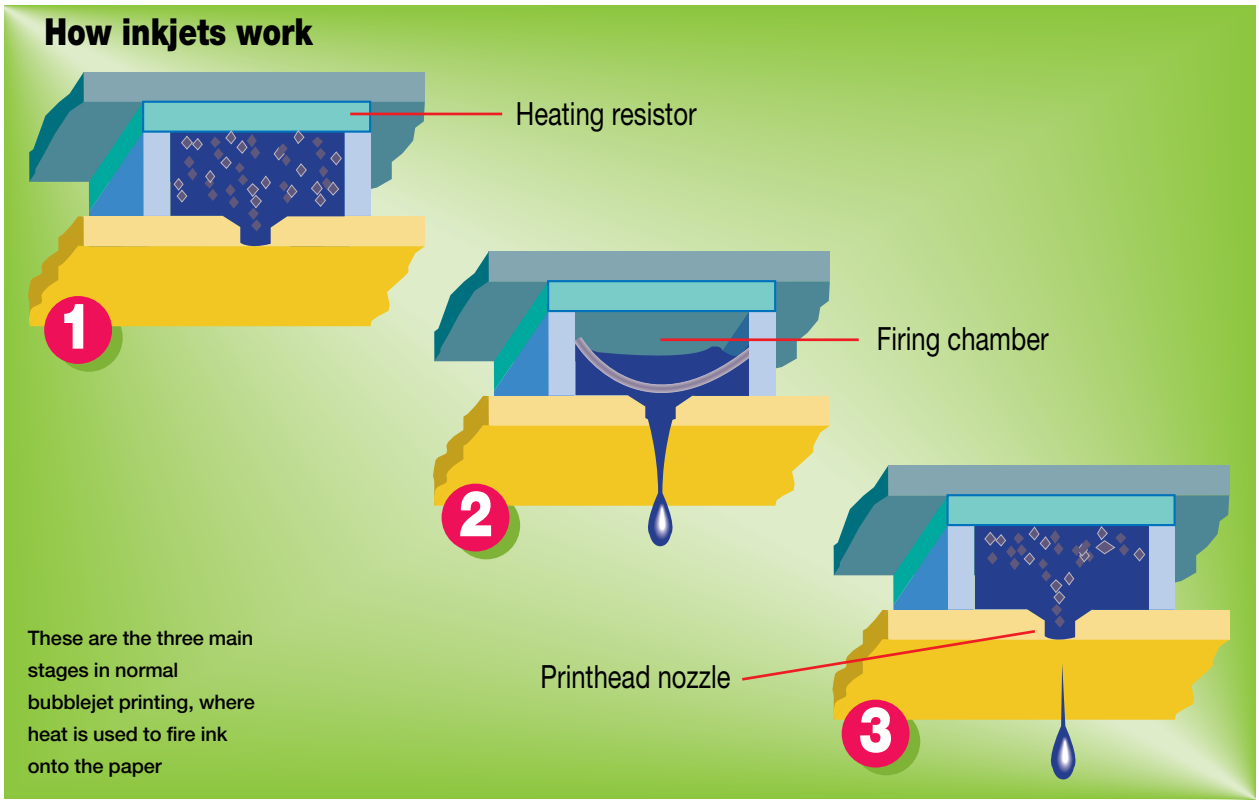
HOW INKJETS WORK



These are the three main stages in normal bubblejet printing, where heat is used to fire ink onto the paper

There are several types of inkjet technology, although the most common is "drop on demand". This works by squirting small droplets of ink, through tiny nozzles, onto the paper. The amount of ink propelled onto the page at any time is determined by the driver software which dictates which nozzles shoot droplets and when.

Most inkjets use thermal technology whereby heat is used to fire ink onto the paper. Using this method, the actual squirting is initiated by heating the ink to create a bubble until the pressure forces it to burst and hit the paper.

Epson's printers work by using a slightly different method, called piezo-electric technology. This achieves the same end, of squirting ink onto paper, but instead of using heat to propel the ink, it uses a piezo-electric cell to mechanically displace and pump the ink through the inkjet head. There are several advantages to the piezo method. Unlike normal bubblejets, the ink does not have to be heated and cooled between each cycle. This saves time, and the ink itself is tailored more for its absorption properties than its ability to withstand high temperatures. This allows more freedom for developing new chemical properties in inks.

The nozzles used in inkjet printers are hair fine and on early models they became easily clogged, which was messy and frustrating. On modern inkjet printers this is rarely a problem, but changing cartridges can still be messy on some machines. Another problem with inkjet technology is a tendency for the ink to smudge immediately after printing, but this, too, has improved drastically during the past few years with the development of new ink compositions.

Inkjets hold a number of clear advantages over other printing technologies, the most obvious being that they have become incredibly cheap to buy and run. Another major advantage (developed over the past few years) is their ability to produce colour output as well as near laser-quality text. As the technology is fairly simple, inkjets require very little maintenance and are more environmentally friendly than lasers, because cartridges are more compact and easier to dispose of.

Colour

Creating colour accurately on paper has been one of the major areas of research in colour printing. Like monitors, printers closely position different amounts of key primary colours which, from a distance, merge to form any colour; this process is known as dithering.

However, monitors produce light directly, whereas the paper output from printers *reflects* light. So, monitors mix the light from phosphors made of the primary additive colours: red, green and blue (RGB), while printers use inks made of the primary subtractive colours: cyan, magenta and yellow (CMY). White light is absorbed by the coloured inks, reflecting the desired colour. In each case, the eye perceives the entire spectrum of colours from a mixture of just three primaries.

The reproduction of colour from the monitor to the printer output, known as colour matching, is another major area of research. Colours vary from monitor to monitor and the colours on the printed page do not always match up with what you see on your screen. Additionally, the colour generated on the printed page is dependent on the colour system used by the particular printer model, not by the colours shown on the monitor. Bear in mind that there are some colours generated on-screen in the RGB colour model which simply cannot be reproduced on paper using CMY inks. What you see on-screen is not necessarily what

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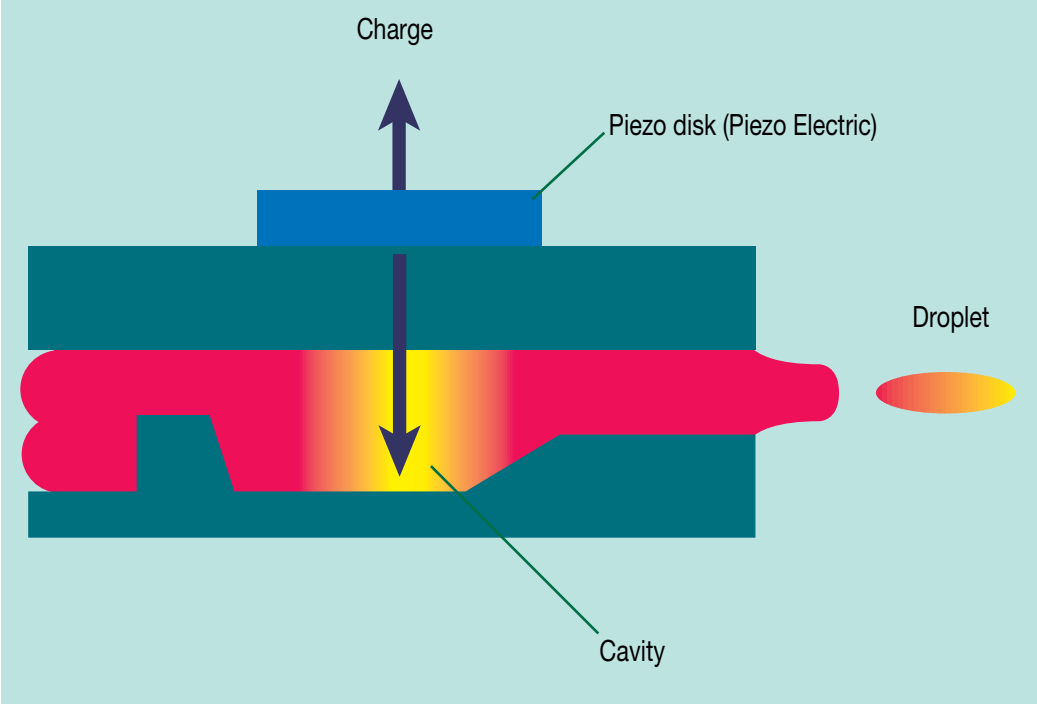

Epson's inkjet technology does not use heat. Instead, ink is forced out of the cavity using a piezo-electric cell

you get on paper.

Most inkjets these days are able to print in colour and black and white, but the way they switch between the two modes varies between different models. The basic design is determined by the number of inks in the machine. Printers containing four colours — cyan, yellow, magenta, and black (CMYK) — can switch between black and white text and colour images all on the same page with no problem. Printers equipped with only three colours, can't.

Many of the cheaper inkjet models have room for only one cartridge. You can set them up with a black ink cartridge for monochrome printing, or a three-colour cartridge (CMY) for colour printing, but you can't set them up for both at the same time. This makes a big difference to the operation of the printer. Each time you want to change from black and white to colour, you must physically swap over the cartridges. When you use black on a colour page, it will be made up from the three colours, which tends to result in an unsatisfactory dark green or grey colour usually referred to as composite black.

Paper and ink

Whatever technology is applied to printer hardware, the final product consists of ink on paper, so these two elements are vitally important when it comes to producing quality results. Two very different types of ink are used in inkjet printers: one is slow and penetrating and takes about ten seconds to dry; the other is fast-drying ink which dries at about 100 times this speed. The first type is generally better suited to straightforward monochrome printing, while the second is used for colour. With colour printing, different inks are mixed, so they need to dry as quickly as possible to avoid blurring. If slow-drying ink is used for colour printing, the colours tend to bleed into one another before they have dried.

The ink used in inkjet printer technology is water-based and this poses other problems. The results from some of the earlier inkjet printers were incredibly prone to smudging and running, but over the past few years there have been enormous improvements in ink chemistry. Using oil-based ink is not really a solution to this problem because it would impose a far higher maintenance cost on the hardware, so printer manufacturers are continually progressing the development of water-resistant inks; unfortunately, the results from inkjet printers are still weak compared with laser printers.

One of the major goals of inkjet manufacturers is to develop the ability to print on almost any media. The secret to this is ink chemistry, a subject which is closely guarded by inkjet manufacturers. Companies like Hewlett-Packard, Canon and Epson invest large sums of money in research and are making continual improvements to ink pigments, light-fastness and water-fastness, and their suitability for printing onto a wide variety of media. Canon already has a large specialist printer which uses a 256-nozzle head to print at 400dpi on a wide variety of textiles. It prints on all kinds of fabrics without fading or washing off.

Most of the current generation of inkjet printers require high-quality coated or glossy paper for the production of photo-realistic output and this can be very expensive. One of the ultimate aims of inkjet printer manufacturers is to make colour printing media-independent, and the attainment of this goal is generally measured by the output quality achieved on plain copier paper. There have been vast improvements over the past few years, yet coated or glossy paper is still required to achieve full-colour photographic quality. Some printer manufacturers like Epson even have their own proprietary paper which is optimised for use with its piezo-electric technology.

Inkjet printers can become very expensive to run when printer manufacturers tie you to their proprietary consumables. Paper produced by independent companies is much cheaper than that supplied directly by printer manufacturers but tends to be made for its universal properties, rarely taking advantage of the idiosyncratic features of particular printer models. A great deal of research has gone into the production of universal paper types which are optimised specifically for colour inkjet printers. PLUS Colour Jet paper, produced by Wiggins Teape, is a coated paper produced specifically for colour inkjet technology. Conqueror CX22 is designed for black ink and spot-colour business documents, and is optimised for both inkjet and laser printers.

Eleanor Turton-Hill

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Group Test Inkjet Printers

PRINTER OUTPUT RESULTS

Canon BJC 240

Canon BJC 4200

Canon BJC 4550

HP DeskJet 820Cxi

HP DeskJet 870Cxi

Integrex BetaJet C

Citizen ProJet IIc

Citizen Printiva 600

Epson Stylus Color IIs

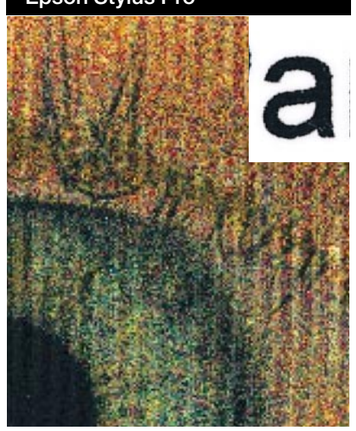
Lexmark 1020

Lexmark 2050

Lexmark 2070

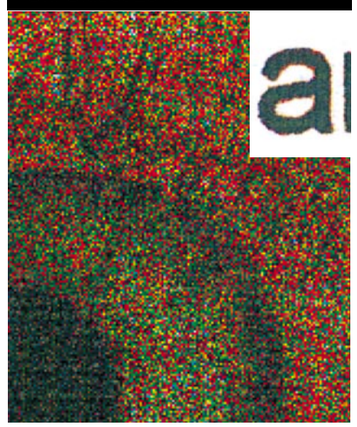
Epson Stylus Color 500

Epson Stylus Pro

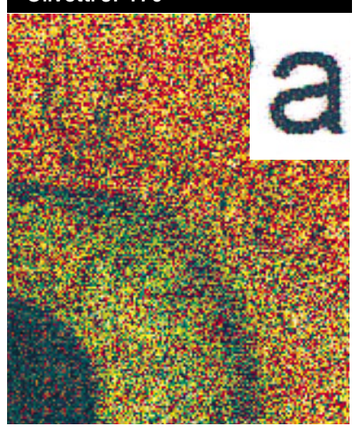


HP DeskJet 660c

Oki OkiJet 2010



Olivetti JP170



Tally T7118

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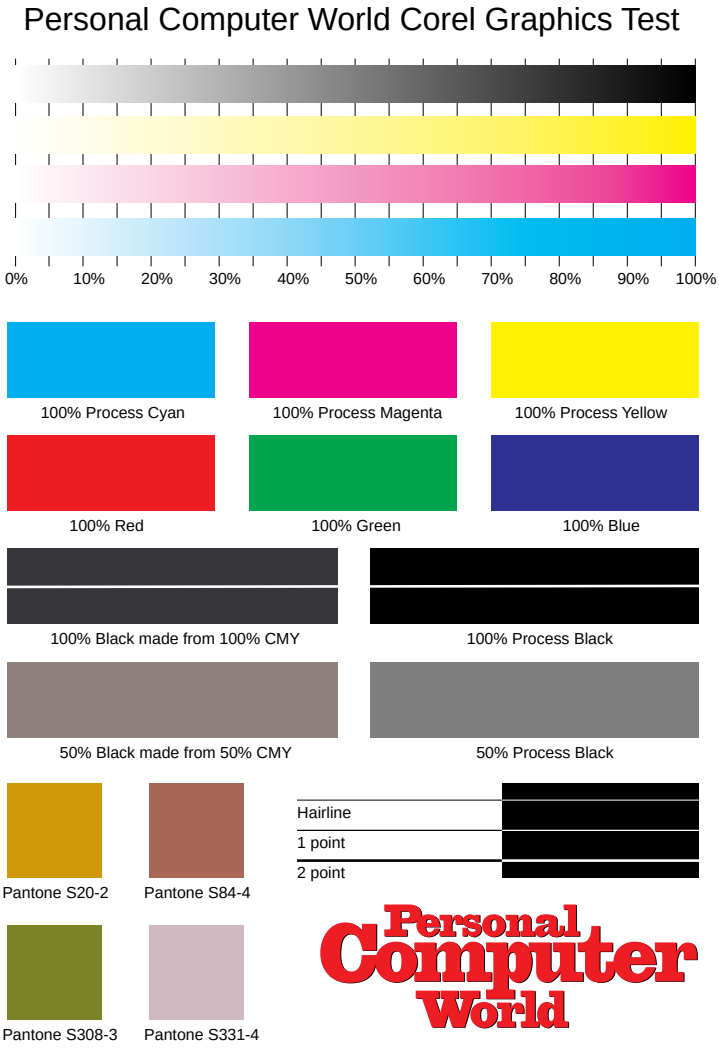
THE COLOUR TESTS



The text test consists of a full page of text set in 10 point Courier. The test is set to output 10 consecutive pages of the same document and measure the time taken to complete it. This figure, in seconds, is then divided by the number of pages printed to derive the average time it takes to print a page. All settings remain the same for each printer used. The end result gives an indication of print speed capability as well as overall mono text quality.

The Corel test indicates how well a colour printer can handle solid colours, coloured graduations, colour matching, and finest detail. All elements on the page were created in CorelDraw 6 for Windows 95, and also represent how well the printer can handle typical presentation graphics. At the top of the page are four bars, created in CorelDraw to smoothly graduate from 0% of the colour, to 100% solid colour. There is one bar for each of the four process colours, cyan, magenta, yellow and black. Smooth graduations are difficult for colour printers to reproduce, and are a severe test for the driver's dithering capabilities. Some printers smoothly change the density of dots, while others show visible and undesirable banding. Below the graduated bars are solid blocks of colour, which again may indicate banding on a final print. The blocks are also placed against each other to indicate any bleeding between colours. The cyan, magenta and yellow blocks should be made up of pure ink, while the red, green and blue are mixtures. Next down are blocks made of pure black ink, and black made up from equal quantities of cyan, magenta and yellow. The same blocks again, only of 50% density, are repeated below. Here it is possible to compare solid black ink with that made up of the three process inks. Obviously the three-colour printers can only produce black from an equal mix of the three primary inks. In the bottom left are four standard Pantone process colours, which along with the primary blocks above, can be compared with reference swatches for colour accuracy. In the bottom right are three lines, measuring two points, one point, and a hairline thick. A hairline is the finest line a printer can produce, and is an indication of detail and resolving power. These three lines also pass through a solid black block to indicate white on black (WOB) inverse performance. The hairline WOB is particularly susceptible to bleeding from the surrounding black ink.

Solid coloured bars are all very well, but they give no indication of how a printer will reproduce full-colour, continuous-tone photographic images. The best test for this clearly is to print such a photograph. We used Photoshop 3.0.5 for Windows 95 to print an 8Mb A4 image. We chose this image of a human eye for several reasons. First, all skin tones are notoriously difficult to reproduce, and the eye picture contains many subtle variations, along with very fine textured detail. Sharp detail is catered by the eyelashes, requiring black ink to be placed near lighter colours without bleeding. The iris itself contains a wealth of detail and fine shades, and the white portion of the eye contains very fine blood veins, both presenting a demanding test.

Both the Corel and Photoshop tests were used for quality and speed purposes. All tests were done under Windows 95, on IBM PCs with Pentium 133MHz processors and 16Mb RAM.

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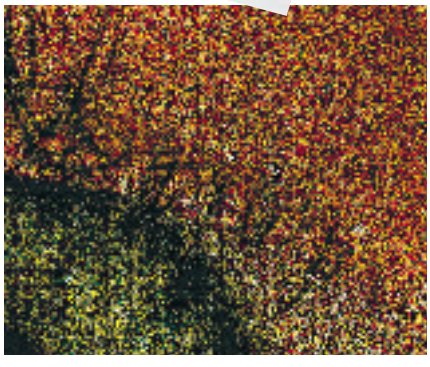
EDITOR'S CHOICE

Personal Computer World Editors Choice

Overview

If only one thing has been highlighted by this group test, it is the fact that inkjet printers are progressing, technologically, at a substantial rate. As we know, the three-colour printer has been around for several years now and has succeeded in making colour inkjet printing an affordable option; but as the superior four-colour model becomes cheaper to produce, one can expect the swappable cartridge model to gradually be phased out. One of the major goals over the next few years will be to make colour inkjet printing as media-independent as possible, and a great deal of research has gone into this area. This research has already borne fruit as many of the higher-end inkjet printers are now capable of printing on different types of fabric as well as transparencies.

Another trend now emerging is the home user market for photo reproduction. This has been made possible by two major technological advances. The first, and most major, is that affordable inkjet printers are now capable of producing photo-realistic output. But the second, and more interesting, is the birth of the digital camera. Pictures from a digital camera can be sucked directly into your PC, touched up and manipulated using image editing software, and printed out directly in glorious high-quality inkjet colour. The important point will be the quality of the digital camera's resulting images, combined with the pricing of high-quality glossy paper. At present, both items are on the expensive side which makes home photo production uneconomical, although the passing of time is expected to mitigate this.



Conclusion

As always, it came down to crunch time for the *PCW* team to decide which one of the many inkjet printers would take the Editor's Choice award. This was no small task, considering that we had 18 from which to choose. What made the task more difficult was the large number of newly-launched printers, particularly from the big players such as Hewlett-Packard, Canon and the up-and-coming Lexmark. All had tremendous strengths, either in speed, price and quality or a combination of all three.

Surprisingly, all the printers we reviewed were priced at less than £500 even though we originally considered a price point below £1,000. This is a good indication of the direction that inkjet pricing is taking, and as quality improves the consumer can only benefit.

The winner of our Editor's Choice award is the Hewlett-Packard 870Cxi Professional Series printer. It thoroughly impressed us in its handling of all the tests and the quality of its output was excellent. With a score of just over 7ppm (pages per minute) on our text print test, it exceeded even H-P's claimed rate of 6ppm. In addition, the quality of the text output was clear and dark, and showed no sign of bleeding into the paper. In terms of colour, it more than proved its worth. Aside from being quick, it also maintained a high-quality output. Add to this the ease of installation, excellent colour controls, good documentation and the inclusion of loads of TrueType fonts, and you have yourself a whizz-bang printer. It may be one of the more expensive models but you wouldn't be disappointed to have it at the office or, if you're blessed, at home.

Two other printers are worthy of our Highly Commended award. The first is the Canon BJC 240. With an expected launch price of £169 (plus VAT) it should be one of the most affordable quality budget printers around. Its text and colour printing may not be the fastest but the quality is formidable, especially when using the photo-ink cartridges on Canon's high-resolution and glossy paper for reproducing photo images.

Our other Highly Commended award goes to the Lexmark 2050: it's the perfect mid-budget printer for either the home or small office. Not only was the print quality wholly respectable, but it was quick as well. An added plus is the Lexmark Workshop CD-ROM which has programs for creating custom T-shirt transfers, certificates, greetings cards and comic books for the kids. It's perfect for the home.

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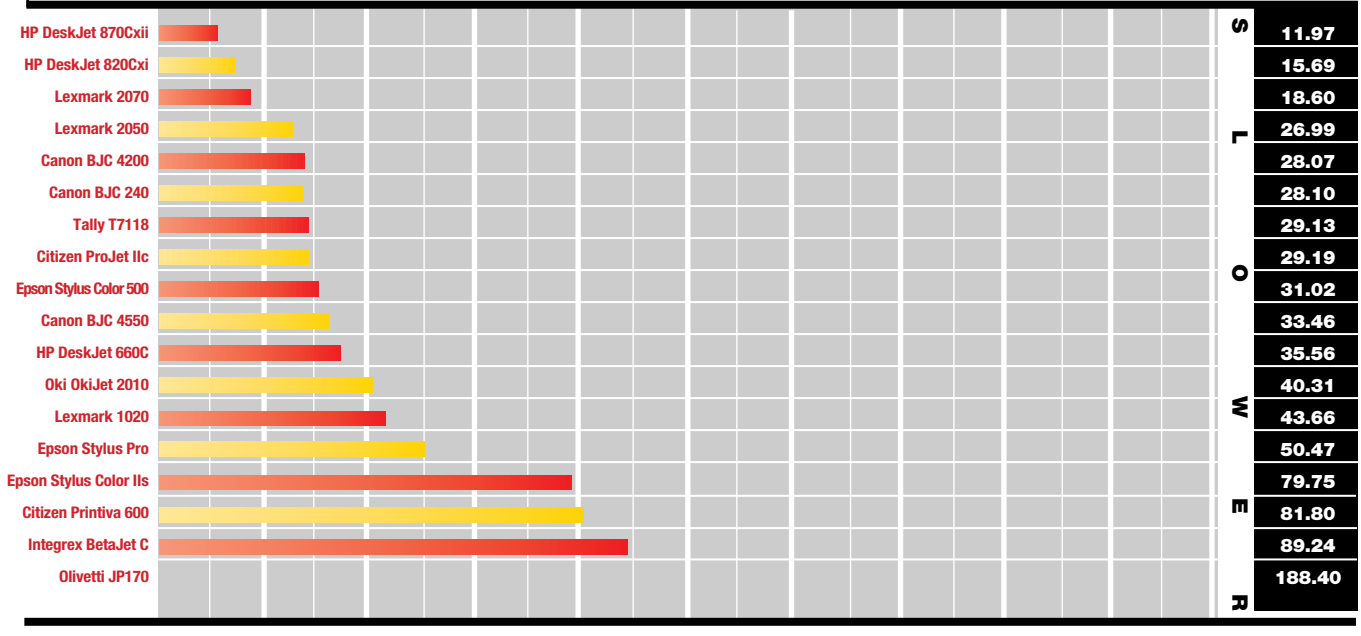
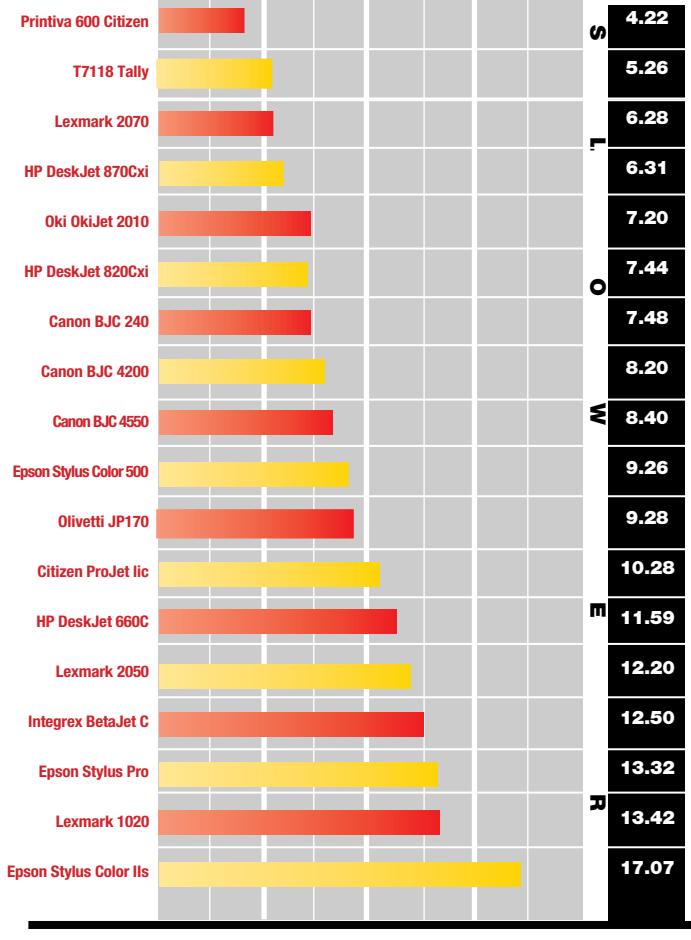
Text/Speed Results



Colour Speed Results - CorelDraw



Colour Speed Results - Photoshop

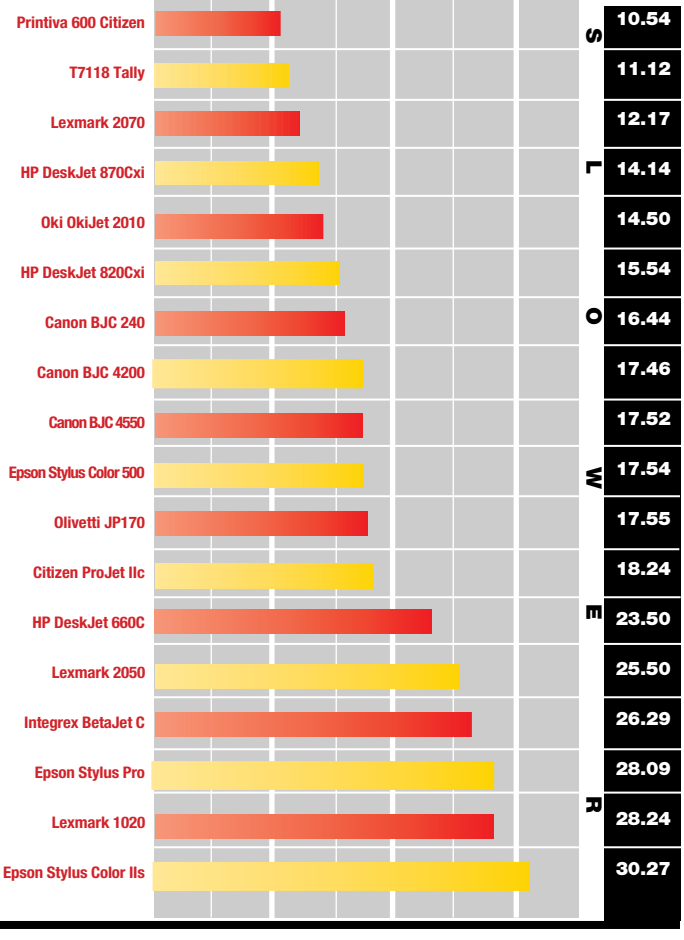


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Table of Features

Manufacturer	Canon	Canon	Canon	Citizen	Citizen	Epson
Model	BJC 240	BJC 4200	BJC 4550	Printiva	ProJet IIC	Stylus Color IIS
Tel No	0121 680 8062	0121 680 8062	0121 680 8062	01753 584111	01753 584111	01442 61144
Fax No	0121 693 5070	0121 693 5070	0121 693 5070	01753 582442	01753 582442	01442 227227
Price (excl. VAT)	£169	£249	£450	£493	£279	£197
Technology:						
3 or 4 (or 5) colour	3	4	4	4	3	3
Engine	Canon	Canon	Canon	Citizen	Olivetti	Epson
RAM (memory)	40Kb	64Kb	64Kb	32Kb	30Kb	15Kb
Maximum RAM	n/a	n/a	n/a	n/a	n/a	15Kb
No. of fonts	5 + 20 scaleable T T	6 + 20 scaleable T T	7 + 20 scaleable T T	500 bitstream on CD	3	3 bitmap, 4 scaleable
Size (h x w x d in mm)	347 x 208 x 176	365 x 223 x 198	216 x 447 x 253	185 x 425 x 235	140 x 360 x 360	114 x 397 x 206
Resolutions:						
300 x 300dpi	❍	❍	❍	●	●	❍
600 x 600dpi	❍	❍	❍	●	❍	❍
Max. print area on A4 (w x h mm)	n/a	n/a	n/a	n/a	n/a	204 x 210
Other	360 x 360, 720 x 360	360 x 360, 720 x 360	360 x 360, 720 x 360	n/a	n/a	360 x 360, 720 x 720
Supplies:						
Cost of 3-colour cartrridge	£24.99	£40	£40	£5.99 (each colour)	£19.50	£21.99
Cost of mono cartridge	£19.99	£26	£26	£4.15	£5.69	£15.49
Colour cartridge life (pages)	100	100	100	n/a	n/a	n/a
Mono cartridge life (pages)	500	130	130	n/a	n/a	n/a
Claimed Speed (ppm)						
Colour	3.4	0.8	0.8	1	n/a	1
Mono	4	4.8	4.8		n/a	2.5
PDLs/ Emulations:						
PCL	❍	❍	❍	❍	●	❍
HPGL	❍	❍	❍	❍	❍	❍
Epson	●	●	●	●	optional	●
PostScript Level 1	❍	❍	❍	❍	n/a	❍
PostScript Level 2	❍	❍	❍	❍	n/a	❍
Other	IBM	IBM	IBM	RAL	n/a	❍
Paper Feed:						
Paper tray capacity (pages)	100	100	100	100	70	100
Output tray capacity (pages)	100	100	100	n/a	n/a	100
Min paper weight (gsm)	64	64	64	80	n/a	64
Manual feed capability	●	●	●	●	●	❍
Ports:						
Parallel	●	●	●	●	●	●
Serial	❍	❍	● (RS-422)	❍	❍	❍
Ethernet	❍	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍	❍
OS Drivers:						
Win 95	●	●	●	●	●	●
Win 3.x	●	●	●	●	●	●
Windows NT	optional	optional	optional	❍	❍	available
O/S 2	optional	optional	optional	❍	❍	❍
DOS	●	●	●	❍	❍	available
Other	N/A	N/A	Mac/Quick Draw GX	❍	❍	❍
Driver Utilities/Extras:						
Media selection	●	●	●	●	●	●
Colour correction	●	●	●	❍	●	●
Resolution enhancement	●	●	●	❍	❍	❍
Dithering method	●	●	●	●	●	●
Ink-saving mode	❍	❍	❍	❍	❍	●
Presentation mode (best quality)	●	●	●	●	●	●
Other:						
Warranty	3 yrs RTB	3 yrs RTB	3 yrs RTB	2 yrs RTB	2 yrs RTB	1 yr RTB
Bundled software	Colour Desk	Colour Desk	Colour Desk	500 bitstream font CD-ROM		

● Yes ❍ No

Table of Features

Manufacturer	Epson	Epson	Hewlett-Packard	Hewlett-Packard	Hewlett-Packard	Integrex
Model	Stylus Color 500	Stylus Pro	DeskJet 660C	DeskJet 820Cxi	DeskJet 870Cxi	BetaJet C
Tel No	01442 61144	01442 61144	0990 474747	0990 474747	0990 474747	01283 550880
Fax No	01442 227227	01442 227227	0171 735 5565	0171 735 5565	0171 735 5565	01283 552028
Price (excl. VAT)	£291	£436	£294	£354	£420	£129
Technology:						
3 or 4 (or 5) colour	4	4	4	4	4	3
Engine	Epson	Epson	Hewlett-Packard	Hewlett-Packard	Hewlett-Packard	Olivetti
RAM (memory)	56Kb	64Kb	512Kb	128Kb	512Kb	21Kb
Maximum RAM	56Kb	n/a	n/a	n/a	n/a	n/a
No. of fonts	5 bitmap, 4 scaleable	5 bitmap, 4 scaleable	35 scaleable	50 scaleable TT	26 + software fonts	n/a
Size (h x w x d in mm)	156 x 433 x 234	182 x 488 x 530	199 x 436 x 405	226 x 444 x 396	226 x 444 x 396	342 x 147 x 116
Resolutions:						
300 x 300dpi	❍	❍	●	●	●	●
600 x 600dpi	❍	❍	●	●	●	❍
Max. print area on A4 (w x h mm)	204 x 280	n/a	n/a	n/a	n/a	200 x 280
Other	360 x 360, 720 x 720	360 x 360, 720 x 720	n/a	n/a	n/a	n/a
Supplies:						
Cost of 3-colour cartrridge	21.99	21.99	23.4	25.8	25.8	23
Cost of mono cartridge	15.49	15.49	22	23.6	23.6	17.5
Colour cartridge life (pages)	320	N/A	350	360	360	100
Mono cartridge life (pages)	620	N/A	650	840	840	500
Claimed Speed (ppm)						
Colour	2	1.5	1.5	4	4	0.4
Mono	4	3	4	6.5	6.5	2
PDLs/ Emulations:						
PCL	❍	❍	HP PCL3	HP PCL4	HP PCL5	DeskJet 500C
HPGL	❍	❍	❍	❍	❍	❍
Epson	●	●	❍	❍	❍	❍
PostScript Level 1	❍	● optional	❍	❍	❍	❍
PostScript Level 2	❍	● optional	❍	❍	❍	❍
Other	IBM X24E	IBM optional	QuickDraw for Mac	QuickDraw for Mac	QuickDraw for Mac	❍
Paper Feed:						
Paper tray capacity (pages)	100	100	100	150	150	70 (optional £20)
Output tray capacity (pages)	100	100	50	50	50	30
Minimum paper weight (gsm)	64	64	60	60	60	80
Manual feed capability	❍	❍	●	●	●	●
Ports:						
Parallel	●	●	●	●	●	●
Serial	❍	optional	❍	❍	RS-422	optional
Ethernet	❍	optional	n/a	n/a	n/a	❍
Other	❍	coax, twin coax	n/a	Mac adaptor	Mac adaptor	❍
OS Drivers:						
Win 95	●	●	●	●	●	●
Win 3.x	●	●	●	●	●	●
Windows NT	❍	available	n/a	n/a	n/a	❍
O/S 2	❍	❍	●	n/a	n/a	❍
DOS	●	available	●	●	●	❍
Other	❍	❍	n/a	n/a	n/a	Acorn RiscOS
Driver Utilities/Extras:						
Media selection	●	●	●	●	●	●
Colour correction	●	●	●	●	●	❍
Resolution enhancement	❍	❍	●	●	●	❍
Dithering method	●	●	●	●	●	●
Ink-saving mode	●	●	●	●	●	●
Presentation mode (best quality)	●	●	●	●	●	●
Other:						
Warranty	1 yr RTB	1 yr RTB	3 yrs	1 yr	1 yr	1 yr RTB
Bundled software	Print Artist		HP DeskJet Print Sys	HP DeskJet Print Sys	HP DeskJet Print Sys	

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Table of Features

Manufacturer	Lexmark	Lexmark	Lexmark	Oki	Olivetti	Tally
		Personal Computer World Highly Commended				
Model	Color Jetprinter 1020	Color Jetprinter 2050	Color Jetprinter 2070	OkiJet 2010	JP 170SC	T118C
Tel No	01628 481500	01628 481500	01628 481500	01753 819819	01206 505152	01734 788711
Fax No	01628 481886	01628 481886	01628 481886	01753 819899	01206 505151	01734 791491
Price (excl. VAT)	£180	£285	£375	£340	£179	£255
Technology:						
3 or 4 (or 5) colour	3	4	4	4	3	3
Engine	Lexmark	Lexmark	Lexmark	Oki	Olivetti	Olivetti
RAM (memory)	21Kb	29Kb	29Kb	n/a	128Kb	128Kb
Maximum RAM	n/a	n/a	n/a	n/a	n/a	n/a
No. of fonts	All Windows fonts	All Windows fonts	All Windows fonts	n/a	30	5
Size (h x w x d in mm)	198 x 360 x 208	305 x 432 x 267	297 x 436 x 277	297 x 433 x 269	360 x 375 x 200	361 x 141 x 361
Resolutions:						
300 x 300dpi	●	●	●	●	●	●
600 x 600dpi	❍ 300 x 600	●	●	❍	❍	❍
Max. print area on A4 (wxhmm)	200 x 292	200 x 287	200 x 287 mm	n/a	203 x 283 mm	n/a
Other	n/a	n/a	n/a	600 x 300	600 x 300	mono
Supplies:						
Cost of 3-colour cartrridge	27.44	27.44	28.09	26.13	32.44	37.1
Cost of mono cartridge	26.68	23.26	25.23	24.2	48.3	29.06
Colour cartridge life (pages)	200	200	200	200	not quoted	200
Mono cartridge life (pages)	1000	1000	1250	1000	3000	800
Claimed Speed (ppm)						
Colour	2 to 4	2	1	0.3	not quoted	0.3
Mono	3 - draft, 2 - letter	5 - draft , 4 - letter	7 - draft , 6 - letter	3	up to 3	n/a
PDLs/ Emulations:						
PCL	n/a	❍	❍	❍	●	●
HPGL	n/a	❍	❍	❍	❍	❍
Epson	n/a	❍	❍	❍	❍	❍
PostScript Level 1	n/a	❍	❍	❍	❍	❍
PostScript Level 2	n/a	❍	❍	❍	❍	❍
Other	Windows Printing Sys.	❍	❍	❍	IBM 4207 (ProPrinter)	❍
Paper Feed:						
Paper tray capacity (pages)	100	150	150	150	40	70
Output tray capacity (pages)	50	50	75	25	40	n/a
Minimum paper weight (gsm)	60	60	60	60	64	n/a
Manual feed capability	●	●	●	●	●	❍
Ports:						
Parallel	●	●	●	●	●	●
Serial	❍	❍	❍	❍	optional £45	optional
Ethernet	❍	❍	❍	❍	❍	❍
Other	❍	❍	❍	❍	❍	❍
OS Drivers:						
Win 95	●	●	●	●	●	
Win 3.x	●	●	●	●	●	●
Windows NT	●	❍	❍	❍	●	●
O/S 2	❍	❍	❍	❍	●	❍
DOS	❍	❍	❍	● via Win. DOS box	●	❍
Other	❍	❍	❍		Unix	❍
Driver Utilities/extras:						
Media selection	●	●	●	❍	●	●
colour correction	●	●	●	❍	●	●
Resolution enhancement	●	●	●	●	❍	❍
dithering method	●	●	●	❍	●	●
Ink-saving mode	●	●	●	❍	●	❍
Presentation mode (best quality)	●	●	●	❍	●	●
Other:						
Warranty	1 yr on-site upgradable	1 yr on-site upgradable	1 yr on-site - upgradable	1 yr, on-site	1 yr on-site	2 yrs RTB
Bundled software	Lexmark Workshop CD	Lexmark Workshop CD	Lexmark Workshop CD			

● Yes ❍ No

MARK HUDSON

Crime buster

Even the most law-abiding citizens could feel the strong arm of the law. Clive Akass meets Robin Lawrence, a counterfeit cop from FAST, who estimates that most PC users have used illegal software at some stage.

There can be few PC users of more than a couple of years standing who have not at some time used unlicensed software, even if it's only a shareware package never registered because seldom used. Attitudes are complicated because software is like no other product — witness the browser war, in which Microsoft and Netscape have been giving the stuff away. Software may cost a fortune to produce but it costs virtually nothing to reproduce, so that stealing it can seem a matter of little consequence. Moreover, piracy can act as a form of promotion, a fact some in the software industry will admit in private but never publicly.

This was particularly true in early DOS days when almost all users were beginners and needed to learn quickly what available packages could do. The word-processor software "borrowed" from a friend frequently ended up on an office machine, leading to the purchase of many corporate licenses.

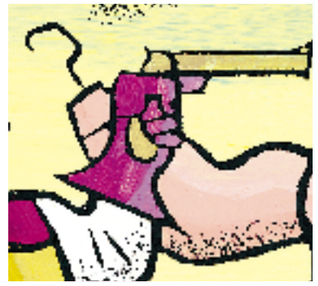
More and more vendors are legitimising this form of promotion by posting trial beta versions of their software on the web. Netscape founder Jim Clarke said in London last year that most of his company's income came from companies going official on copies of Navigator downloaded by staff.

Windows put the brake on a lot of low-level piracy because it requires most packages to be properly installed. DOS packages usually work on a simple copy and a mention in autoexec's PATH line. But piracy, and attitudes to piracy, have changed drastically in many other ways, according to the Federation Against Software Theft (FAST). The federation was formed in 1984 at government request to "act as an interface" between the industry and the police, who were struggling to come to terms with the new forms of crime emerging with the nascent industry.

FAST's operations manager Robin Lawrence told me: "When I started nine years ago there were a lot of recreational pirates — individuals who copied software because they saw it as a challenge or because they wanted to give the software to friends. Fairly harmless reasons but obviously still a breach of the law. Now, the serious criminals have moved in and they are making a lot of money."

Piracy is divided into two broad categories: simple copying, and counterfeiting (when an attempt is made to pass a product off as genuine). Counterfeiting makes the most money because goods can be sold at retail prices, but it also carries the heaviest penalty: a maximum of ten years as opposed to two years for copying.

The latest breed of relatively cheap CD recorder, using gold-coloured blanks, has led to a big increase in commercial copying, some of it by highly-organised groups, Lawrence says. "You will have someone who sources the programs and compresses them, somebody who puts them on a DAT tape or some other medium. That then goes to the factory and the factory may outsource to a number of individuals who actually make the CDs. They are then sent back to a central depot."



Some of these CDs are sold in boot sales and street markets. The majority end up in what Lawrence calls the black channel, which exists in parallel with legitimate retails channels. A gold CD with tens of thousands of pounds worth of software (judged by shelf prices) can sell for as little as £50.

The typical buyer is a small dealer who puts together PCs from modules and sells them in a cut-throat clone market. Lawrence said: "There are many hundreds of computer cloners who will install pirated software to enhance their sales and make their boxes more attractive than the next guy's Pentium."

Some such vendors undoubtedly resent the massive discounts on bundled software that allow giant PC makers to undercut smaller rivals by £100 or more per system, even before bulk hardware prices are taken into account. (The EC is currently investigating claims that Microsoft discounts for the likes of Gateway constitute unfair competition.)

The temptation to pirate software is all the greater because of the trend towards pre-installed packages with disk-based manuals: customers no longer expect to get a box and manual and a pile of disks.

"A customer will come bowling along and wants the latest Pentium 133, with Windows 95, and Lotus Smartsuite 95, or whatever, and the dealer puts it on illegally," Lawrence said. "I, as the customer, just think I am getting a good deal because I have no expectations of getting anything other than what purports to be on the computer, and I walk away with copied software."

This is not a victimless crime, as many perceive it to be. The PC buyer is not going to be entitled to support for the software purchase, and will be obliged to pay the full price of a package in order to get upgrades. A lot of companies, particularly smaller ones, get caught out in this way, Lawrence said. They buy machines out of the box, only to discover later that the software on them is pirated and they will have to buy licences to stay legal. Occasionally, FAST informs them of the fact, or they find out when upgrading.

Software publishers could theoretically cripple an offending company under these circumstances by obtaining an injunction for an immediate block on the use of the software. "They don't tend to do that because these people are victims too," said Lawrence.

Legitimate PC vendors also suffer from being undercut by crooked rivals. In fact, they are a source of a lot of FAST tip-offs. "We get complaints from dealers who say: 'How can this dealer here sell that Pentium 133 or 166 at that price with all the software on it, when I can't even buy the hardware for that and make it myself?'"

FAST also gets a lot of tip-offs from police and customs men, and its officials scan newspapers and magazines for suspicious small ads. Lawrence did not wish to be photographed for this article for fear that he might be recognised when making test purchases.

Last year, his team executed 74 search warrants and recovered software worth £65 million retail, although this is a notional value because pirate purchases do not equate to lost legitimate sales. Lawrence showed me a gold disk containing software worth about £15,000 retail. It included Lotus 1-2-3, PC Anywhere, a suite of Adobe products, a smattering of soft porn, and some typefaces.

A small-scale operation selling gold CDs like this can make up to £1.5 million a year, Lawrence claims. "It's almost a cottage industry. You only need about £1,000 of equipment — that is, a computer and a CD writer. Depending on how much you are prepared to spend, you can make one gold CD an hour, or a hundred, or a thousand." FAST is aware of about 300 pirate "compilation albums", which are given names like Tango, Lilt, or Cream. "Why they choose these names I don't know, but they do."

I scanned Lawrence's face when he claimed his technicians frequently find viruses on gold compilations: the industry is not above putting out black propaganda, and you'd think anyone with the nouse to put together a gold disk would have the sense to do a scan.

But Lawrence did not falter, and his follow-on story was too amusing to be discounted. It seems that the pirates themselves get pirated. Getting a compilation together from scratch is not easy and the people who do it are proud of their work; naturally, the easiest way to get a good compilation is to cherry-pick other pirates.

So the pirates hide signature code on the CD,

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together with a trojan horse — rogue code hidden within a legitimate program. If programs are copied off a CD without the signature, the trojan will wipe the hard disk of the host machine. Lawrence said: "It's like a copy protection device for pirates. Ironic, isn't it?" It is a course of action many legitimate software houses might envy. As Lawrence said: "Any commercial vendor doing that would get shafted."

FAST reckons about 50 percent of revenue losses stem from outright dishonesty; the rest stems from companies having more users than licences. "The corporates aren't necessarily deliberately doing it. It happens because of bad control, recklessness ... they don't usually make any commercial gain."

Corporate attitudes, once lackadaisical, have swung emphatically in favour of legitimacy. Corporate misuse is much more likely to be discovered (the industry has set up a shop-your-boss hotline) and is generally seen as counterproductive, with technical staff spending a large proportion of their time solving problems caused by unauthorised software. Also, corporates have less excuse for bad management, with the emergence of packages designed to maintain an audit of what software is in use on a network.

Even with the best will in the world, corporates can still be caught out. Lawrence showed me two Microsoft Office Professional disks, one genuine and the other fraudulent, which were bought together by a large company through a legitimate dealer. The company buyer became suspicious when he noticed the yellow on the two disks did not match up and he called FAST. Lawrence said the mixing of legitimate and illicit products, almost certainly done outside Britain, is a favourite ploy because it enables pirated software to be sold at top prices. "It is probably fair to say that the [UK] dealer did not know." The crudity of the fake Microsoft label (professional was spelt with a double 'f') was surprising in view of the fact that the disk clearly stemmed from a major international organisation.

Commercial-standard silver CDs are pressed in multi-million-dollar plants, of which there are only about six in Britain. These are easily monitored, and are very careful what they press, so pirate silvers are invariably imported by criminals, "who are prepared to front maybe several million dollars to buy consignments," Lawrence said.

The pirate silvers are pressed under the guise of official production runs, or as run-ons, at plants in the old Eastern Bloc countries or China, and have appeared in Britain only over the past 18 months.

FAST is not yet interested in the illicit software going free on the web. "It is a problem, and it will increasingly be a problem," Lawrence said. "The warez sites let you download software but they are not making any money. FAST's focus is on the [retail] channel."

Lawrence knows the best way to curb piracy is to get the co-operation of users, and to do that he still needs to change attitudes. His message is simple: "If your dealer is pirating software, he is taking money from your pocket." Nevertheless, a lot of people do profit from piracy, and it is going to be with us for as long as there are software licences. FAST's work is a slow, uphill struggle. ■

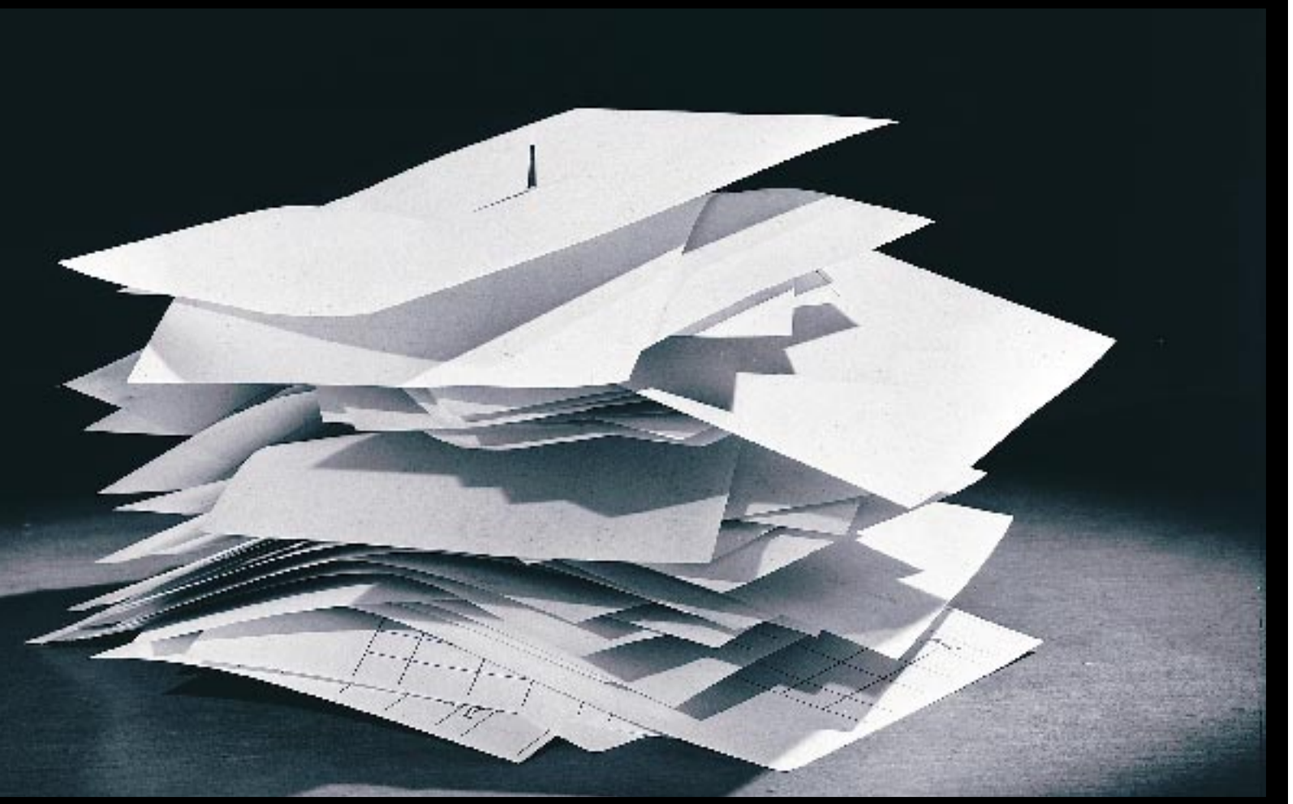
Escom: cause for complaint

High-street chain Escom admitted during the months leading up to its demise that some of its shops had bundled unlicensed software with machines.

The company told *PCW* that over-enthusiastic salesmen had been to blame. Lawrence put on a slightly different gloss. "We had more complaints about Escom in a 12-month period that we had ever had with any company before. We entered into lengthy negotiations with Escom and it responded very adequately at the time. It sent immediate instructions out to the stores and we provided training. But it would appear with hindsight that its infrastructure could not keep up with the demands of being a major high-street reseller.

"... Escom had the licences but unfortunately its administration did not keep up with tracking those licences. The customers were being deprived of their legal rights because, without the licence, they weren't going to get technical support and they weren't going to get upgrades."

New developments



Windows 95 has changed the face of database development, and developers are now taking advantage of what it can offer. Eleanor Turton-Hill looks at how the top packages have addressed the new OS.

Database packages change more slowly than any other category of software. That's because, unlike many other desktop applications, databases are central to the running of businesses and require continual updating and maintenance. As data builds up over time and applications become more complex, so the expertise of developers also grows. Over the years, this process results in a general reluctance to move to newer technologies. Consequently, progress has been slow.

The PC database has not so much taken over, but rather, has developed alongside older technologies. In the early eighties people began to realise that the PC was more than a toy and could actually be used to develop useful applications. Then in 1984 dBase for DOS came along, providing an extremely popular programming language for developers, and at that time the desktop database became one of the most important applications you could have on your system.

Gradually PC databases grew independently of company mainframes, sometimes as personal files, and sometimes as shared applications on LANs. Users found that they could solve problems on PCs quickly and efficiently using off-the-shelf software like Excel to create spreadsheets, or Paradox to create their own simple databases. So, as PCs found their way into offices, users gradually began to take control of their own computer needs. In many ways, this was a good thing. People found ways of solving problems quicker than the IT department would have taken just to acknowledge them. But in other ways, PCs created a great deal of frustration and inefficiency. Data was often duplicated and new information could not be cross-referenced with the existing mainframe data. PC experts and mainframe experts appeared to talk in different languages, and no-one understood how to integrate new and old technology. Consequently, lots of pools of data grew in isolation.

Then, about five years ago came "client/server", a computer architecture which promised to unite all these independent pools of data into integrated systems. For a while client/server was over-hyped as the ultimate solution to the world's problems, and to many people in IT, it seemed nothing more than the latest computer fad. But over the past few years client/server systems have been implemented on a massive scale and now play a major role in the computing plans of just about every major corporation.

Many of the high-end RDBMS packages have been beefed up with a layer of middleware which enables them to communicate with SQL servers. This allows database developers to build powerful integrated front-ends which users understand, while behind the scenes the server deals with all the heavy data management work.

Here, we'll look at a diverse spectrum of database packages currently on the market. Some are end-user tools developed purely for the creation of small databases stored either on the desktop or the LAN; others have been built as power tools for programmers and developers for constructing sophisticated custom applications. Not all packages here have been upgraded to Windows 95, and not all of those which have moved to the new OS are running on 32-bit code. As the needs of the market have changed, different manufacturers have reacted at different rates, and this is very much reflected in the type and complexity of tools within each of the products included here.

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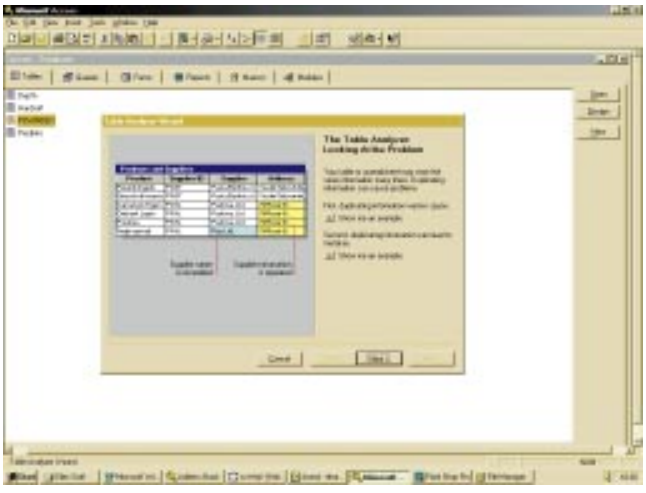
Databases Contents

Access 7.0



One of the most impressive tools in this version of Access is the Table Analyser Wizard, which automatically converts flat files to relational databases

The first Windows 95 version of Access was launched late last year under a cloud of controversy. First, the product was not finished in time to be shipped along with the rest of the Microsoft Office Suite (Pro version), leaving many initial users in the lurch. Secondly, when Access finally arrived, the RAM requirements turned out to be higher than originally stated. Many users who'd invested in the Suite during the early stages found themselves with a copy of Access which they were unable to use, and Microsoft was forced to hand out refunds.

Access 7.0 is certainly demanding on system resources. The official RAM minimum is 12Mb, unlike the rest of the Office Suite which has an official minimum of 8Mb. Hard disk space is a strain too. The typical installation takes up 42Mb while the maximum custom installation takes up a stupendous 54Mb!

Access 7.0 has a lot to offer. As well as being the first Windows 95 (and full 32-bit) version of the software, there are several important new features and enhancements which make this version more integrated with the Microsoft Office Suite, more accessible to a wider variety of users and, in many other ways, a more fully-functioned application.

Access 7.0 offers a selection of ready-made solutions similar to those used in Approach. There are pre-prepared databases designed for the home user, with titles like Video Collection, Recipes and Expenses. A Database Wizard creates the system to your specification, prompting you with questions and allowing you to choose the fields you want. Pre-designed forms and reports are provided, as well as a few records of sample data.

One of the most impressive features of this new version of Access is the Table Analyser which is designed to aid the process of converting flat files to relational databases. This has never been an entirely simple task even for experienced database developers, because files created in spreadsheets lack the data integrity which a relational database enforces. So, when it comes to converting spreadsheet files, data has to be thoroughly cleaned and restructured. The Table Analyser Wizard in Access 95 performs this process for you. It is able to look at a wide variety of flat-file formats, intelligently decipher inconsistencies in record entries and split the file into a set of related tables.

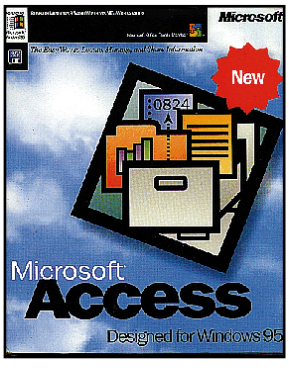
Easily the most significant feature for application developers is the change to the programming language, which has now been replaced with Visual Basic for Applications (VBA). This provides a consistent scripting language for building solutions across the whole of Microsoft Office, making it possible for code written in Access to be used in Excel or Visual Basic (VB4).

OLE Automation has also been drastically improved in this version. Access 2.0 was able to act as an OLE Automation Controller, making it possible to control other applications. Access95 goes a step further, making itself available as an OLE Automation server. This means that the application as a whole can be manipulated by OLE Automation Controllers such as Visual Basic, Visual C++ and Excel.

Access 95 is no cosmetic upgrade: it's 32-bit from top to bottom and full of major improvements which boost its functionality for all types of user. The major downside of the product is its hardware requirements, and the extra strain on system resources was confirmed in our performance results which reveal a clear generation difference between Access 7.0 and Access 2.0, not to mention the massive disparity with Visual FoxPro. If you're thinking of upgrading your current application to Access 7.0, you may find that as well as upgrading memory, you also need the extra boost of a Pentium processor.

The lower than expected sales of Windows 95 have made the upgrading process to Access 7.0 slow, and all sorts of other factors have hindered the product's market success. Upgrading a major application is time-consuming, disruptive and, worst of all, expensive. The cost incurred in programming time and hardware upgrades has made Access 7.0 a no-no for most firms using version 2.0.

Then there's the one-way factor. Access 7.0 runs on Windows 95 and Windows NT 3.51, but not on Windows 3.x. It will run most Access 2.0 files but there are some compatibility restrictions, and once you've converted files over to Access 95, they won't run in version 2.0. This one-way compatibility can be a major headache, especially when your system is scattered about in different file formats during the transition process. All these factors will make mass-scale movement to 32-bit applications, a complex and long-winded process.



PCW Summary

Access 7.0

Price £99 (upgrade), £269 (full version)

Contact Microsoft 0345 002000

Good Points VBA provides much improved integration with the rest of MS Office. GUI enhancements and new wizards make application building easier for the end-user.

Bad Points Hogs hard disk space.

Conclusion Functionally, a major improvement on Access 2.0, but hampered by its large system footprint.

★★★

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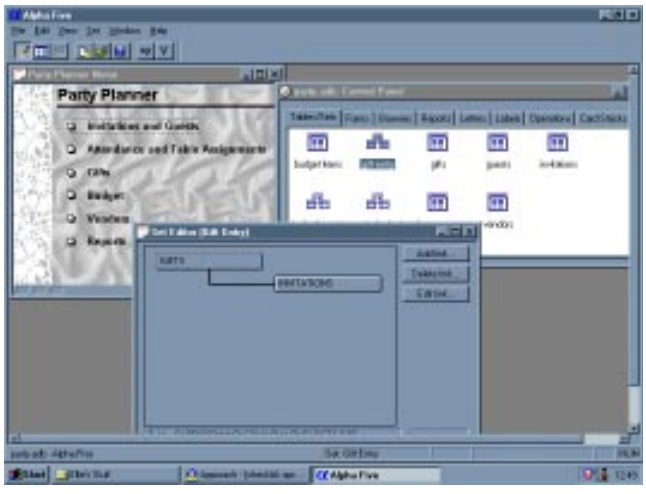
Alpha Five



One of the ready-made applications in Alpha Five. You can see from the Control Panel that within one overall project file there are many sets and even single tables. The holding file, now confusingly called a "database", keeps all these elements together

Several manufacturers have tried to make database management systems which provide visual tools to aid non-experts in the creation of simple flat-file or basic relational systems. Alpha Five fits into this end-user category and has made the move to Windows 95, building in many of the GUI features of the operating system as well as adding new facilities and altering some tools which were felt to be lacking in its first incarnation.

There's no programming language with Alpha Five. Everything you need to do in a database application is provided in the form of some built-in or pre-prepared function. The central Control Panel from version 1.0 now appears as a tabbed box with eight pages, in similar style to Windows 95's Explorer. This holds the current database and associated files including reports, queries and import/exports. Each element is now represented as an icon.

Continuing from the previous version, Alpha Five still uses the terms "database" and "set" to describe its constituent parts, but confusingly, their meanings have changed. Database is no longer used to describe a single data file, but is now a collection of tables, sets, layouts and support files which relate to a particular project. A set is a collection of related files, which is the thing you would normally refer to as a relational database. Here, a database can contain many sets, and to confuse things even more, the word "application" is used too. This is a collection of layouts which are stored in something called a card stack. None of this terminology is very helpful, but the well-designed interface does help to make things clear. Many of the database commands are now available through right-click menus which are context sensitive, so everything is easy to operate.

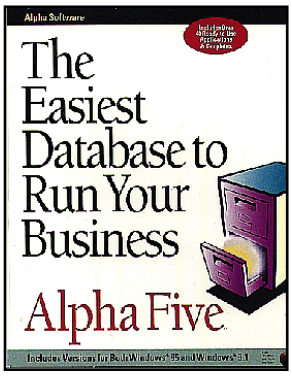
Unusually for this kind of low-end product, there is an editor which allows tables and their relationships to be defined graphically. This is called the "set editor" and is accessible by right-clicking on a set. Within the set editor, linked tables are illustrated in terms of lines and boxes, like entity relationship diagrams. If you have a complex table structure, the set editor can be used to sketch out all the relationships in the application. The joins defined between tables can be re-defined by double-clicking on a line and resetting the key fields in the link information dialogue box.

The link information dialogue box also allows referential integrity rules to be set up between parent and child tables. The manual gives simple advice on how to structure groups of tables into a coherent set so that your application makes the most efficient use of the data, avoiding any redundancy or duplication.

One vast improvement in this version is the scrapping of "modes". Forms no longer have an enter mode, a change mode, or a view mode, so users are able to edit and change data without first stipulating which mode they're in. Also, you can now edit child databases without using embedded sub-forms.

Query By Form allows the user to perform simple queries which sort or filter data. The Query interface simply uses the data-entry form as a means of defining criteria for filters and has become fairly standard of late. The other significant improvement is that memo fields can now be searched for character strings.

Forms, reports, letters and mailing labels can be created using a selection of layout editors, each one with functions specific to the object being created. A floating toolbar allows all the usual types of object to be placed on forms, such as buttons, bitmaps, list boxes and radio buttons. Forms, reports and other layouts from version 1.0 will convert automatically to the new version, but scripts are more problematic.



The xbasic scripting language is not yet available for version 2.0, so this version, the Home and Business Edition, is difficult if you want to convert your scripts from version 1.0. Most scripts will run with no problem, but many of the menu options have changed in this version so the menu_run() command will either produce unexpected results or not work at all. Worse, in this edition there's no way of editing scripts to correct their behaviour, so make sure you back up version 1.0 files before converting.

Alpha Five is one of the best end-user products on the market. The easy point-and-click style interface makes application building genuinely easy, and the manuals provide well-written explanations of database theory to guide you in design and structure. An ideal package for small-to-medium-size databases, but not a serious developer's tool.

PCW Summary

Alpha Five

Price £59.95 (Home and Business Edition)

Supplier Alpha Software 01752 897100

Good Points Excellent upgrade for existing Alpha Five users. Excellent design tool for defining relationships. Cheapest package in this round-up.

Bad Points Not suitable for large or complex databases. Shame about the incompatibilities with transferring scripts.

Conclusion Unlike Approach, Alpha Five is not pretending to be anything but an RDBMS for non-experts, and it's in this capacity that it really scores. Excellent value for money.

★★★

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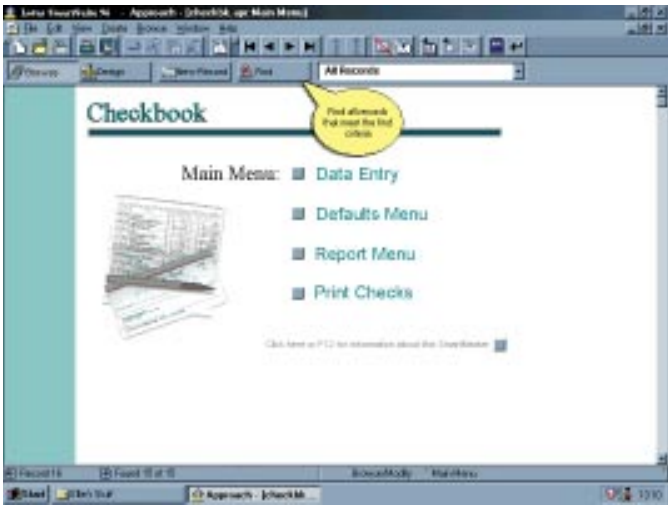
Lotus Approach 95

Personal Computer World Editors Choice



This checkbook database is one of the pre-prepared solutions in Approach. It tracks your withdrawals, deposits and payments and includes monthly tracking reports

Approach has graduated to the Windows 95 platform and the current version is a fully 32-bit application. The nice thing about Approach is that it has been designed from the ground up to meet the needs of the end-user, and it's this unequivocal goal which has given the product its strong identity. It has been built to take full advantage of the Windows GUI without being troubled by the problems associated with cross-platform development or compatibility with a previous DOS version.

When you create a database in Approach, you automatically create a holding file which gathers together all the forms, reports and queries related to a particular project. This is called the Approach file and it provides a window through which you can create various views of data. All of the actual work of editing, sorting and reporting is done in the Approach file while the data itself is kept behind the scenes and updated transparently.

The neat thing about this arrangement is that it allows you to open up, combine, analyse and report on any type of data which is available to you. It does this using what Approach calls Power Keys. These allow databases of practically any format to be opened directly without having to perform imports, or use any kind of intermediary file or filter. PowerKeys allow direct access to a range of formats including Paradox, FoxPro, Oracle SQL, dBase, and DB2. When you create a file, the file type defaults to dBase IV, but you can also create files which conform to dBase III plus, FoxPro and Paradox.

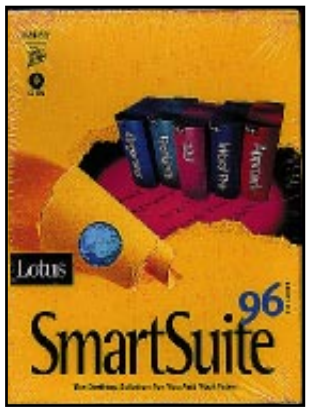
New in this version is a PowerKey driver designed specifically for Notes and giving direct access to Lotus Notes data. This is customisable via a simple setup dialogue box which allows you to specify how you access Notes data. Using Notes and Approach together makes a lot of sense. With Notes at the back-end, users are able to take advantage of rigorous security and replication benefits, while Approach, at the front-end, provides user-friendly reporting and analysis tools.

A list of predefined templates is set up for commonly-used databases such as Accounts, Customers or Expenses plus some more imaginative titles like Guest List, Friends and Family, Musical Groups and Wine List. Each one of these contains relevant fields and a simple form ready for data-entry. All the preset characteristics can of course be modified to suit your needs, and files can be created from scratch if necessary.

A selection of more fully-fledged applications, called SmartMasters, are for a specific use such as contact management or employee information. Each one (there are eleven) comes with its own professionally-designed reports, and programmed actions built-in using the scripting language.

Approach's Design mode provides some excellent tools for creating sophisticated, interactive front-ends, reports and mailing labels without using any code at all. New three-dimensional effects can be applied to database fields and text blocks, and more graphics file formats are supported in this version such as PCX, JPEG, WMF and TIFF.

Over the past few years, Approach has slowly become recognised as a contender in the client-server market. IBM's involvement in the product has encouraged this development and Approach 96 is now being bundled with DB2 for Windows NT. The programming language has also been revamped, with the Object Browser, Program Editor and Debugger now integrated into one development environment.



The Sax Webster Custom Control has been included in the CD-ROM version of the product, allowing users to store and categorise internet web sites and program internet functions like extracting and charting data from specified pages.

It will be interesting to see how Approach develops. With Approach being bundled with DB2 for Windows NT, the product looks set to become the graphical front-end for the entire DB2 family. The built-in scripting language still lacks the kind of fine-tuning which allows the development of sophisticated database applications, but Approach does manage to combine genuine ease of use with powerful data analysis tools.

PCW Summary

Lotus Approach 95

Price £99

Contact Lotus 01784 445808

Good Points Genuinely easy to use and has powerful data analysis tools. Excellent integration with Notes, and definite speed improvements in this version.

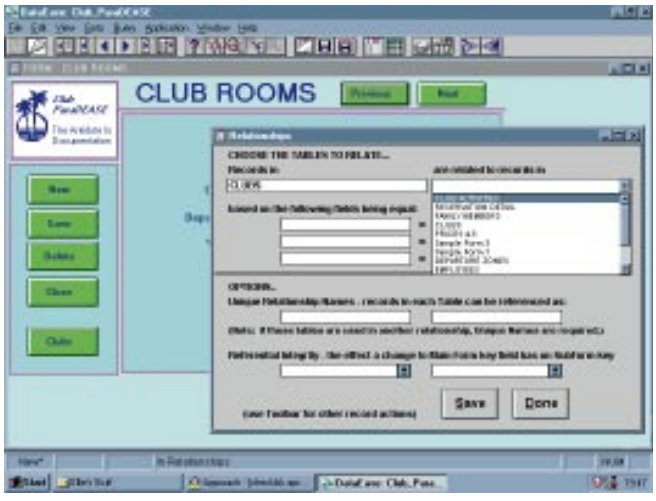
Bad Points Data integrity not as rigorously enforced as it is in Access.

Conclusion One of the best offerings if you're new to RDBMSs and want to create small-to-medium sized applications, but still not ideal for highly-customised applications which require the fine-tuning offered by more sophisticated languages.

★★★★

p179 ➢

DataEase 5.12



Defining relationships is a simple procedure in DataEase, but it lacks the finesse of the interactive box-and-arrow diagrams which have appeared in other products

Before Windows databases appeared on the market, DataEase's big selling point was its friendly DOS user interface which made application building far more intuitive than it was in dBase, which still had the older-style command line prompt. At that time DataEase was regarded as an innovative product, and a massive user-base was built up, particularly in the UK. The advent of Windows changed this comfortable position and DataEase was slow to react to the changing market. This is still a 16-bit application and there is no sign of a Windows 95 version yet, which leaves the product lagging behind its competitors.

There are two versions of DataEase, namely the fully-fledged programmable database, and the "Exec" version which allows developers to distribute their custom applications. These two products now exist for three operating systems: OS/2, DOS, and Windows.

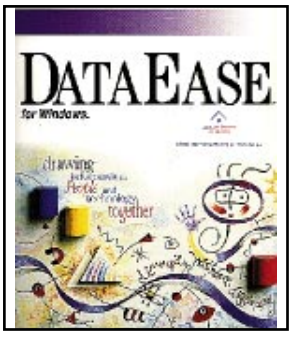
All three versions of DataEase use the same database engine which gives unusual flexibility in a mixed workstation office. Machines using different platforms can happily cohabit running the same network application. This multi-platform flexibility allows you to develop applications in one operating system and run them on another, so if you do need to use all three platforms, DataEase is worth considering. However, the interoperability between different OSs is limited. Data can be shared, for example between DataEase for DOS and DataEase for Windows, with all defined relationships intact, but you cannot open application structures such as forms, reports, menus and procedures. These elements remain OS-dependent.

On the left-hand side of the desktop window there's a catalogue box listing all the forms, tables and reports in the current application. This acts as a kind of holding file for all the associated parts of a database. Two buttons in the top left-hand corner of the screen allow you to toggle between the form designer and the user view. In the form designer, fields can be created from scratch or from a previously-defined table, and a floating tool palette provides a range of functions including command buttons, radio buttons and OLE objects. As new fields are created, a new table is automatically defined. Various pre-prepared form layouts are available to choose from if you don't want to build your own customised design.

Despite some nice touches in the form designer, DataEase is let down by several annoyances, most of them stemming from the original DOS version. There's no distinction between a table and a form. Although every change made in the form is reflected in the table to keep everything absolutely in synch, there are times when it is necessary to create a field for lookup purposes which is not displayed on the form. In DataEase, the only way of doing this is by creating a view of the form which selects the chosen fields for display.

Linking files is a fairly simple process achieved via the relationships option in the Application menu. List boxes on the relationships utility display all the existing tables in the current application, and, once chosen, two list boxes below show all the possible fields which can be linked together. Unlike in Access, however, there is no way of viewing all the current relationships in terms of a graphical diagram or a report.

DataEase 5 for Windows still uses DQL (DataEase Query Language), thus maintaining backward compatibility for the DataEase faithfuls, but as in many other areas of software development, the effort to retain consistency with the past has some negative consequences. The most obvious one is that the language does not exploit the Windows GUI to the full. Although the manuals use "object" terminology and the form designer allows commands to be placed behind graphical objects, the language is limited when compared to full-blown visual programming languages like Access Basic.



For those people with legacy code from the DOS application, the absence of a fully-featured visual language in DataEase will not be missed. But for anyone who's looking for an RDBMS for building powerful Windows applications, DQL is not a serious contender.

In short, the full DataEase for Windows product arrived two years too late. Its success will be largely dependent upon the existing base of DOS users who want to convert their custom applications to Windows, and upon developers who want to write applications for multi-platform environments. For first-time buyers, however, there are much better and much cheaper offerings on the market.

PCW Summary

DataEase

Price £239 (upgrade £149)

Contact DataEase
0181 554 0582

Good Points Good backward compatibility.

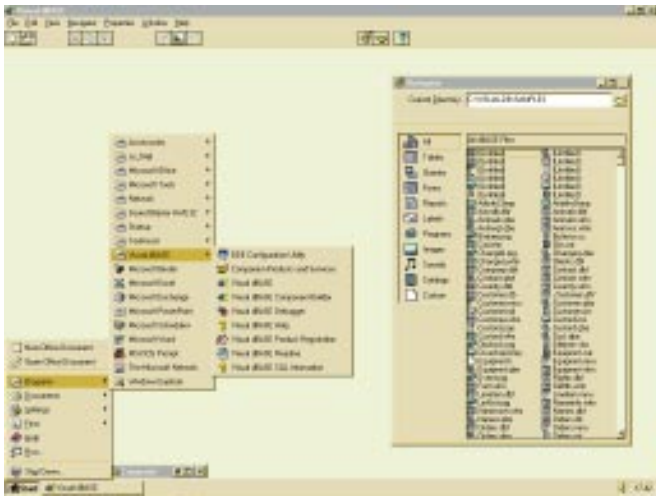
Bad Points Limited programming language. Some design annoyances. Overpriced. Still 16-bit.

Conclusion DataEase has concentrated on its existing user-base. If you're about to go out and buy your first database product, there are better products with languages more dedicated to the Windows environment.

★★

p181 ➢

Visual dBase 5.5



Although the GUI for Visual dBase 5.5 conforms to some of the Windows 95 "look and feel", the product is still running on 16-bit code

The first version of dBase made for the PC was dBase III, which was launched by Ashton-Tate in 1984. It became immensely popular, almost to the point where it was regarded as an industry standard. In 1991 Borland bought out Ashton-Tate, and in 1993 they claimed that a massive 55 percent of the world's installed PC databases were developed with dBase. That's 6.7 million dBase developers and users.

The Windows version of dBase became available last year, carefully designed to retain some of the familiar tools and concepts from the DOS version so as to protect existing investments in software, experience and training, as well as being compatible with dBase III Plus and dBase IV. Visual dBase is Borland's first major upgrade to dBase for Windows and is the first product to conform to some of the new GUI features of Windows 95. It's not a full-blown Windows 95 RDBMS because Borland is still working on 16-bit code, but it does have what the company refers to as the Windows 95 "look and feel".

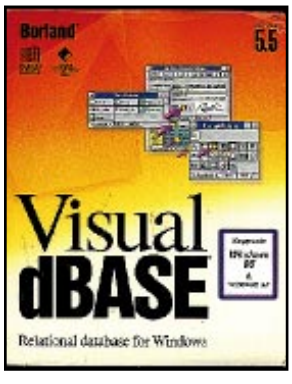
On the surface, this looks like a rather half-hearted upgrade, but several important features have been added which were thought to be missing from dBase for Windows. The most obvious improvement is the .EXE compiler, which will make the distribution of applications for developers much easier. The compiler is able to link all the relevant files without the need for a central project file, and then packs your application onto floppy disk or CD-ROM images. From these images, your program will install complete with a pop-up readme file and an optional splash screen to give the installation a more professional look.

This solves a serious problem for dbase developers who have been crying out for some way to distribute their applications dBase for Windows first appeared. The Distribution Kit which came with the package was a temporary fix to this fundamental problem, and the fact the Borland has now provided a way of packaging applications for distribution, will help the product gain more respect as a serious developer's tool.

Visual dBase allows you to generate code interactively when you create queries, reports or forms. This also works in the other direction — that is, if you alter the code used to generate a form, the changes will be refelected graphically in the associated query or form. This two-way tool provides non-programming users with a way of generating working pieces of code from a graphical interface, and for experienced programmers, it speeds up development time.

dBase for Windows added object-orientated extensions to the dBase language, providing strong support for Windows features and encouraging developers to build applications by integrating predefined or custom objects. Borland claims that its Object dBase is more object-orientated than Paradox's ObjectPal because it provides all of the traditionally recognised tools such as encapsulation, inheritance and polymorphisim. These object-orientated capabilities have been beefed up in Visual dBase. You can save your own custom forms as base forms. Other forms, which are derived from the base form, inherit all of that form's characteristics, and when aspects of the base form are changed, these are carried through to all the relevant derived forms.

The SQL command set has now been integrated into the dBase language, allowing embedded SQL to work with any data source including those attached using ODBC or SQL-links. This creates a slightly uneasy alliance with the existing dBase procedural language. The SELECT statement, which forms much of the meat of SQL, does not behave entirely as it does in its native form. It's not possible, for example, to manipulate returned data from a SELECT statement one row at a time; instead, the entire batch of filtered data is returned into a table, from where it can be processed row by row using the familiar dBase commands. There's no reason why data should not be filtered and processed in this way, but slight variations of this kind will affect the way in which SQL and dBase programmers use the hybrid language to work effectively. A certain amount of rethinking will undoubtedly need to be done before programmers from different backgrounds are able to reach a fruitful and consistent way of working.



PCW Summary

Visual dBase

Price £349 (£59 for upgrade from dBase or Paradox)

Contact Borland 01734 320022

Good Points Serious development tool with a rich programming environment and an excellent interface builder.

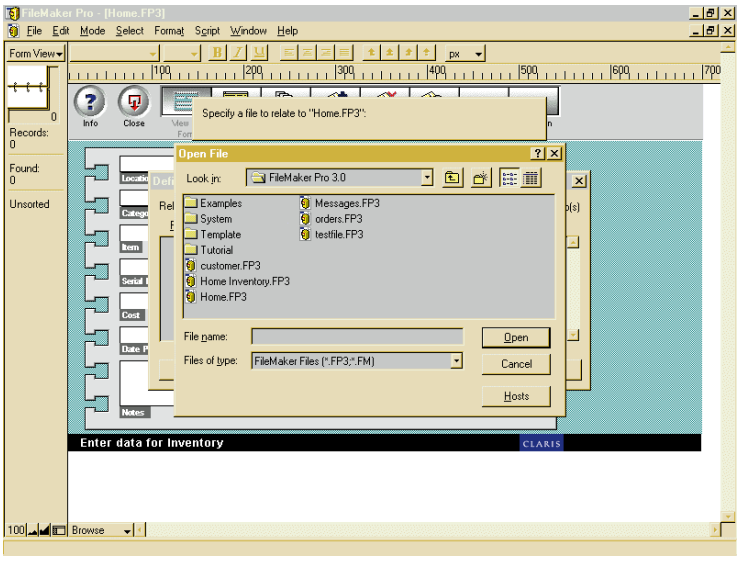
Bad Points Despite the recent performance revamping, it does not perform as well as Visual FoxPro on performance tests.

Conclusion If you're a database developer with a smattering of C knowledge and you want to get into object-orientated code writing, Visual dBase provides all the tools. The product has so far failed to be the huge market success Borland had hoped for, and its commitment to the product is now questionable.

★★★

p182 ➢

Claris FileMaker Pro 3.0



The Define Relationships menu option allows you to link files by defining relationships which link key fields

It's a couple of years since Claris announced that FileMaker Pro would go relational, but it wasn't until January 1996 that version 3.0 finally appeared. Unlike many of the other products included here, FileMaker Pro has always offered simplicity, like the ability to knock together simple data files without having to trample through a quagmire of Wizards and technical manuals.

So, given the attractions of the package, why make it relational? Well, a relational model does provide real benefits. Instead of having lots of isolated flat files, your data can be properly integrated. There are many important functions which simply cannot exist without a relational structure. Secondly, Claris has managed to include the extra functionality without making the product intimidating. There's no underlying programming language for building custom solutions in the dBase or Access sense, and the new interface feels very much like the 2.1 version.

The only way of integrating data from multiple files in version 2.1 was by using lookups which, while useful, were limited. A lookup does nothing more than take a snapshot of a piece of data and copy it from one file to another. Version 3.0 of FileMaker allows you to create live two-way links between files by defining relationships which link key fields, and allowing data from more than one file to be displayed in the same layout.

Setting up relationships is fairly easy once you've got used to the idea of portals. These are a new concept injected into this version to refer to an area on a layout used to display records from a related file. To set up a one-to-many relationship, say, between a company name and a group of orders, a portal is used to display a list of data from the order file. Files from version 2.1 can be converted to version 3.0 complete with lookups and repeating fields, and converted into relational databases. This is not an entirely seamless process as you have to decide where a relationship is more appropriate than a lookup, and layouts must also be redefined.

FileMaker Pro has a large selection of ready-made solutions for business, home, and education, including systems for invoicing, lead tracking and contact management as well as a video collection system and student record database. These are created as ready-made systems but can be customised afterwards to more closely match your needs.

FileMaker has never pretended to be a programmer's package, and the scripting language in version 3.0 is certainly no power tool, but there are several significant improvements. There's a new IF..THEN..ELSE statement and a LOOP.. END LOOP command which makes row-by-row processing and conditional sorting possible. This gives a much greater degree of control over the behaviour of applications, allowing you to test for the occurrence of particular events and act according to their status.

Other improvements include forty new calculation and field validation functions as well as support for TCP/IP. Being a cross-platform product FileMaker has not gone all out in its integration with Windows 95, but there is a healthy sprinkling of right-click functionality as well as support for long file names, and an OLE 2.0 client. The real strength of this product is its cross-platform capability. Files which use OLE objects can be embedded, linked and edited by Windows clients and viewed on the Macintosh as graphics.

This version is native on the Power Mac and there are versions for Windows 95 and Windows NT, but support for Windows 3.x has now been dropped. Many multi-platform users who currently share databases between Mac and Windows 3.1 will be forced to move to Windows 95 in order to upgrade, which may prove costly.

If you're an experienced database user, you'll find FileMaker Pro limited in lots of ways. Although it enables basic relationship definitions, the relational model contains many holes, and if you're used to any degree of control via code, you'll be far happier with a more fully-fledged product like MS Access. If you currently use FileMaker Pro on the Mac, then you'll like the extra functionality in this upgrade. But if, on the other hand, you're a Windows 3.1 user who has not yet thought about Windows 95, this upgrade of FileMaker may be more trouble than it's worth.

PCW Summary

Claris FileMaker Pro 3.0

Claris 0800 422322

Price £239.70 full version, £99 upgrade version

Good Points Simple relational functionality included without altering the appeal of the package.

Bad Points No support for Windows 3.1.

Conclusion Worthwhile upgrade for existing users, but let down by lack of Windows 3.1 support.

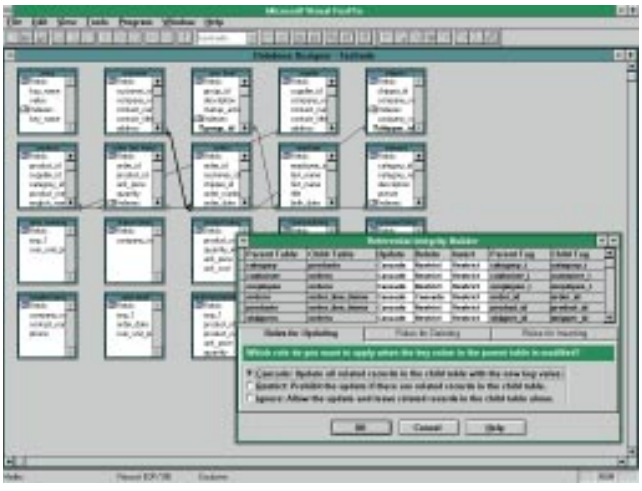
★★★

p187 ➢

Visual FoxPro 3.0

Personal Computer World Editors Choice

Microsoft's FoxPro started life in DOS as a dBase clone but was later extended to the multi-user Unix environment. It was then bought by Microsoft who enhanced the product and transported it to the Mac and Windows. Until version 2.6, the Windows version of the product was always built so that it maintained complete compatibility with its DOS predecessor. This provided developers with a common interface and code compatibility across both supported platforms, so that programs from the DOS version could be transferred to Windows with little or no change.



The Database Designer, which displays all tables, views and relationships contained in an application

Version 3.0, released last year, was the first 32-bit version of the product and was renamed "Visual FoxPro (VFP)". It sits on Windows NT and Windows 95 but also runs in MS Windows 3.x with the Win32S extensions. Full cross-platform compatibility is ensured so that an application designed on one of these platforms can be run on any of the others. But DOS compatibility was dropped with this version, and the Macintosh version, although promised at the launch last year, has still not arrived.

Unlike previous versions of FoxPro, version 3.0 is built to take full advantage of the Windows GUI. In fact, Visual FoxPro 3.0 is a major generation leap from version 2.6, with substantial improvements made to the client-server capability, visual design tools, and general compatibility with other Windows applications via OLE. The programming language is beefed up with improved object-orientated extensions and a much extended event model which allows access to all Windows-based events.

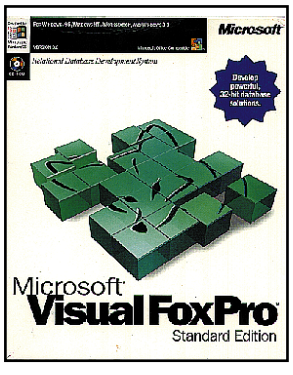
Version 2.x applications can be run directly in version 3.0 or they can be converted using the built-in Converter tool, which puts them into version 3.0 format so that they can be manipulated in the native environment. It's also possible to take 2.x code and modify elements of it to give it version 3.0 functionality.

If you're a FoxPro 2.x user, the first thing you'll notice when starting up FoxPro 3.0 is the Project Manager. This acts as a central holding device for application development very much like the MDB file concept in Access. It acts both as a file organiser and an application compiler, combining the functionality of the catalogue manager and project manager from version 2.6. as well as adding some extra new features. A project in version 3.0 is a collection of files, data, documents and FoxPro objects, all saved together with a .PJX extension.

The other thing you'll notice about the opening screen is that the familiar "Run" button is missing. This is because of other radical changes which have been made to the interface. The concept of a database in version 3.0 is as a container of tables, whereas in previous versions, individual tables were referred to as databases. Functions on the old-style Database menu no longer make sense in version 3.0: the Run menu has had to be eliminated and its functions moved to other menus.

Of the new visual design tools, the most impressive is the Database Designer which displays all tables, views and relationships contained in an application. Within the Designer you can create database schemes graphically, very much like the relationships window in Access.

Referential integrity rules can also be defined interactively in the Database Designer, with various parent-child options. The details of all table relationships are stored in a central data dictionary or container so that all links are consistent throughout the application. When you're creating a form or report, the relationships between tables are created automatically based on relationships defined in the Database Designer.



FoxPro is an impressive application and the next version, currently in beta form, promises many improvements to the developer tools and to performance capabilities (see preview of FoxPro 5.0, *PCW* October). However, although Microsoft acquired the product before the birth of Access, FoxPro still carries with it the status of the adopted child, being excluded from the Office family and lacking the mass-appeal of Visual Basic. Version 3.0 represented a major overhaul both to the interface and the programming tools, but sales have been disappointingly low and the product's future looks bleak. It may be that some of FoxPro's more sophisticated object-orientated tools are incorporated into other Microsoft products in the future.

•PCW Summary

Visual FoxPro 3.0

Supplier Microsoft
0345 002000

Price £179 (upgrade £99); £419 (Professional version, £199 upgrade)

Good Points Great programming facilities for all aspects of Windows application building.

Bad Points Lacks the mass-appeal of other RDBMS products like Access, and has been unable to find itself a comfortable niche in the market as developer tool.

Conclusion Fully-functioned RDBMS for developers, with sophisticated object-based programming tools added to the procedural language, and tools which take advantage of the Windows 95 interface and 32-bit processing.

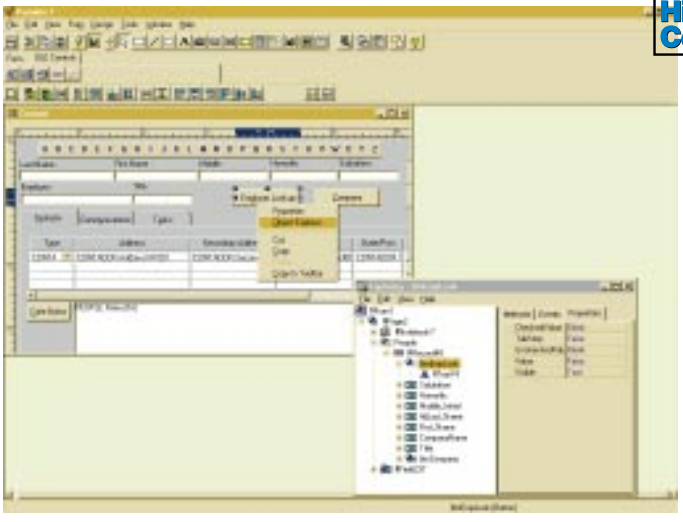
★★★★

p188 ➢

Paradox 7.0

Personal Computer World Highly Commended

The interesting thing about Paradox is the way the interface has been tailored to blend in with Microsoft Office without destroying its integration with Corel's PerfectOffice. All the toolbars are movable and dockable to create a familiar front-end for Office users, while the menu system has been greatly simplified. The Properties menu has disappeared and been replaced with a Preferences tab dialogue box, which is now an option on the Edit menu.



This is the new Object Explorer which replaces the Object Tree from version 5.0 showing methods, events and properties arranged in a hierarchical tree.

All kinds of Experts have been dotted around to help the novice get to work quickly. There's a Quick Start Expert offering a selection of database templates divided into business and personal categories. Select one of them and a database will be created with all the forms, tables and reports you're likely to need.

One of the most impressive new Experts is the Mail Merge Expert, which provides excellent integration with Microsoft Word and WordPerfect. The process is simple and painless. It's all controlled by a series of dialogue boxes which ask you to specify the data file you wish to use, the fields you want to include and which ones you want to sort by. I tested this with Word and the results were impressive, producing 50 custom letters in minutes.

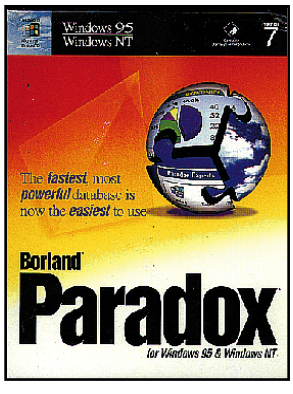
For developers, there are other improvements like the Object Explorer which replaces the Object Tree from version 5.0. This allows you to inspect methods, events and properties in a hierarchical tree arranged in a tabbed Window, and is a definite improvement when it comes to keeping track of the code in your application. The interface is, unsurprisingly, rather Delphi-like in design, and it works well in Paradox where there's always been a strong commitment to object-based code.

This version of Paradox supports OLE 2.0, allowing developers to extend the power of the product by incorporating 16- or 32-bit OCX controls. There's a selection of new controls built into the product to add functionality to custom-built apps. New Tab dialogues allow Paradox applications to keep their consistency with the Windows 95 environment and there are new-style List boxes, combo boxes, a progress bar and a track bar.

When it comes to moving applications from Windows 3.1, most applications built in version 5.0 will run unchanged in version 7.0. The crucial word here is "most". The vast majority of applications can simply be recompiled in version 7.0, but as with any piece of code being transferred to the Windows 95 or NT environment, there are a few cases where a simple recompile will not do the job.

There are other alterations you may have to make which are specific to Paradox. In Paradox 5.0, for example, applications are attached to menus by adding an entry to the PXDLITE.INI file. Under Windows 95 and NT, there is no such startup file; instead, this information is stored in the Registry database. In version 7.0 you can access information in the Registry using a suite of new methods provided for this purpose.

If Paradox is attempting to appeal to a large novice user-base, Borland still has some hard work to do especially when you consider that many users (whether they know it or not) already have Access 95 on their systems as part of the Microsoft Office Suite. And for beginners, Access has many more sophisticated tools on offer like the Table Analyser which converts flat files to relational databases, and the Performance Analyser which recommends ways of speeding up your system and even implements them automatically.



On the plus side, Paradox 7.0 offers some excellent improvements in its development tools over version 5.0, and the simplified menu system makes it far easier to navigate. Paradox has another major advantage over Access: it requires a minimum of 8Mb to run in Windows 95 compared to Access's 12Mb. There's a difference of £100 between the Standard and the Professional version of Microsoft Office, and at just £99 Paradox 7.0 fills the price gap nicely.

To tip the balance even more in its favour, Paradox wins hands down on performance, producing an overall score which is more than twice that achieved by Access. For the more discerning database user, this may well prove to be the deciding factor.

PCW Summary

Paradox 7.0

Price £99

Contact Borland
01734 320022

Good Points Functionally a better product than version 5.0. The upgrading process is smoother than for many other products, as recompiling works both ways.

Bad Points End-user features are not as developed as they are in Access 7.0.

Conclusion A powerful developer's tool but with an increasingly small following. Paradox's modest system requirements give it a significant market advantage over Access. This, combined with excellent performance results, may tempt some of the more discriminating database users.

★★★★

p190 ➢

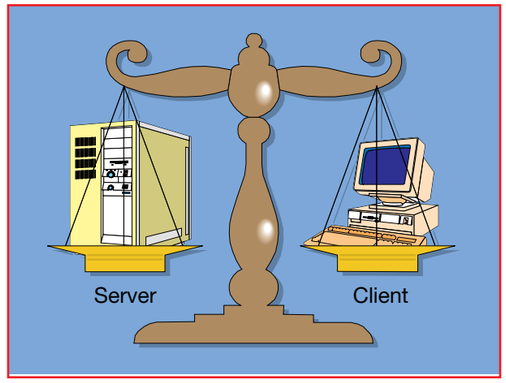
What is Client/Server?

Strictly speaking, client/server is an architecture in which processes running independently send each other requests and provide each other with services. A process that sends a request is a client, and a process that fulfils the request with the required service is the server. A single process can be both a client and a server.

However, the meaning of the term has shifted over the past couple of years to mean something slightly different. The definition provided above is a logical definition in which client and server are understood in terms of their relative functions. These days, most people understand client to mean any machine which sits in front of the user, and server as any machine not in front of the user. In other words, client/server is understood in hardware terms rather than as a model of related processes.

In general, the hardware conception of client/server makes sense. The user's client machine provides the appropriate user-interface logic to make server requests, and the server responds accordingly. In practice, the hardware conception does not fit all cases because there are so many different client/server architectures. It is possible for the server process to sit on the same machine as the client. Client/server software usually shields the user from knowing the physical location of the server by redirecting service calls appropriately, and an individual program can be a client, a server or both.

The great thing about client/server computing is that the client and the server share the workload



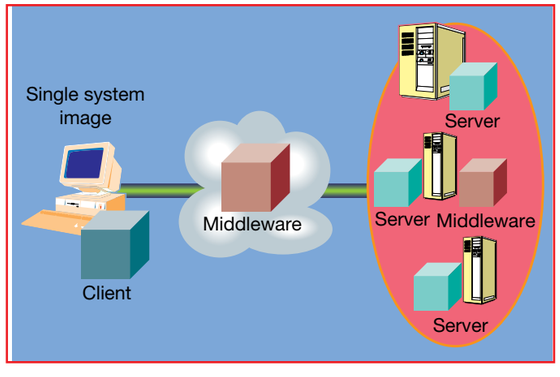
A true client/server system consists of more than just a static pool of data on a LAN. If you develop a database program in dBase or Paradox, move the data files to the LAN's fileserver. You have not created a client/server system, because the server does nothing more than house the files.

A database server is much more sophisticated. The client's request for data is made in the form of SQL commands and the results of these requests are returned over the network. Code residing on the file server processes the SQL commands, and the requested data is filtered out and passed to the client. This provides a more efficient system than the basic file server model previously described, because the code which processes the SQL command sits in the same place as the data and filters out the appropriate data in response to ad hoc queries.

What is Middleware?

Middleware is the distributed software used to support all the different kinds of interactions that go on between clients and servers. It provides the API (Application Programmer Interface) on the client side which allows the client to pass requests to the server, and defines the way the message is transmitted to the server and passed back to the client.

There is a whole range of middleware products designed to provide general functions for client/server systems, such as queuing services, remote procedure calls and communications stacks. These products include operating systems like Netware, which provides distributed file and print services.



Middleware is the distributed software which sits between clients and servers

Other middleware products provide specific functions designed to help you achieve a certain type of client/server task. The four main standards designed specifically for database tasks are Microsoft's ODBC, Borland's IDAPI, Oracle's Glue, and IBM's DRDA. The enormous number of desktop users is forcing the developers towards Microsoft's ODBC standard. Borland's Integrated Database Application-Programming Interface (IDAPI) has not been taken up on anything like the same scale. IBM's DRDA standard has created considerable interest among software vendors and is regarded as a more robust system than ODBC, providing a much better level of performance.

The development of ODBC

Microsoft's Open DataBase Connectivity (ODBC) is a standard set up to provide interoperability between ODBC-compliant applications and ODBC-compliant data sources. It is a C language specification for an Application Programmers Interface (API) that enables Windows client applications to speak to server software in the appropriate SQL dialect. The idea behind this is to provide a communications standard which can be used by database vendors and third-party developers to link their software to any ODBC supporting server. Without this standard, vendors of client software would have to provide APIs for every possible server database which the client may want to talk to.

The basic principle at work is the same as that used for the Microsoft print model, where a generic printer interface in Windows acts as a communications channel between applications and printer drivers. DOS had no such generic interface and therefore printer drivers had to be incorporated within each individual application. ODBC works by routing function calls to a driver created for the destination database. When an application makes a call to ODBC for its database services, a Driver Manager establishes which driver to use for the data source involved. It loads the correct driver and routes the call to it using the interface provided by the server. The driver can then translate the SQL call into syntax which the server can understand, and send the query to it. Report results are sent back to the user and the connection to the data source is terminated.

If ODBC is installed on your computer, you need to install an ODBC driver in the Windows Control Panel for each database type you wish to open

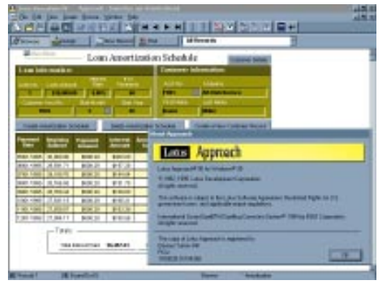
The services which ODBC provides are completely hidden from the developer. ODBC processes requests transparently so that developers do not have to understand the details of particular databases. When you print out a document from Windows, the same principles apply. There is no need to have any knowledge of a printer's internal language.

This is a theoretical description of how ODBC works; in practice, the process is not quite as smooth as that described here. ODBC has been heavily criticised for not really being a standard, as well as giving poor performance. The truth is that ODBC is not just one standard, but many. Applications using ODBC can be written to varying conformance levels which interpret the specification in slightly different ways. If things go wrong, ODBC interfaces are notoriously difficult to debug, and developers complain constantly of poor performance and lack of functionality.

Stability and Resource Management in Windows 95

The transition to Windows 95 has been slow over the past year, especially among those companies who have highly customised and complex applications. What's the point in moving to a new operating system and upgrading your database software if everything's working fine as it is? If it ain't broke, don't fix it. If you're still unconvinced about the benefits of the new OS, here's a brief overview which may help you decide.

The improvements incorporated into Windows 95 offer several fundamental advantages to application building. Two things you will benefit from straightaway are the improved stability of the system when multitasking, and the better handling of system resources. One of the fundamental weaknesses of Windows 3.1 is that all applications as well as operating system code share a single address space called the system VM (Virtual Machine).



In order to take full advantage of Windows 95, you must convert your apps to 32-bit versions

The single address space model is bad news when it comes to system integrity, because applications are not protected from each other and key portions of the operating system are left exposed to buggy programs which can cause the entire OS to crash.

Ideally, each application should be run in its own independent session or VM, where it is protected from other applications and does not jeopardise the OS itself. When an application fails, the effect of the failure should be limited to the session in which it is running. Effectively, what VMs do is protect the system against crashes by ensuring that applications do not write to each other's address spaces.

Windows 95 goes some way towards sorting this out by providing private address spaces for Win32 executables. Unfortunately, Win16 programs still execute as a single process within a shared address space, which means that one faulty 16-bit application can still bring the whole system down. Despite this, the new OS is generally a good deal more stable and Access exploits its multithreading capabilities by having the jet engine, Access 95, and individual Access programs each running in their own independent threads.

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How we did the tests

While in many classes of program, like personal organisers and word processors, ease of use and richness of features are more important than raw speed, databases are in the league where speed still counts. In this round-up, we tested a selection of functions that are available on all the databases such as searching, filtering and indexing operations, and also the speed of report generation.

With all software testing, the most serious pitfalls concern machine configuration. We tested on a Compaq Prolinea 4100, a DX4 100MHz machine with 16Mb of RAM and fast IDE hard disk. This ran Windows 95 with all settings inherited from the standard Microsoft installation routines.

The databases were installed with Standard rather than Custom options and, after each installation, we used the Windows DEFRAG program to condense free disk space into a single extent.

Our first three tests measure application startup times, the time taken to import the test databases, and the time needed to index them. The structure of the data is, by preference, predefined, then the data (in the form of an ASCII comma-separated file) is added, but some programs offer an import wizard that combines both field definitions and import operations. We use two databases: the "master" records contain thirteen columns and 10,000 rows, while the "transaction" file contains 50,000 records of four fields.

The Indexing test produces variable results across the packages, because some programs index multiple fields in a single operation while others require multiple passes through the table. We index four fields (two text, one numeric, one date) in the master file and one field only in the transaction file. Lotus Approach cannot index data in a distinct operation and incrementally builds indexes during its searches. Therefore, we approximated indexing time in Approach by running an "impossible" query against the four fields — the values to be searched for did not exist.

Tests four and five, the core of database testing, are built on indexed and non-indexed searching using both single and multiple criteria. The second, more advanced indexed search test combines multiple criteria across several fields. Despite the additional processing needed for complex queries, many databases take longer when building views to display the larger amount of data resulting from the less selective (simple) searches. Searching was tested using both the form-based query tools, and using filtered views.

Reporting speed was tested using both a simple (column-based) layout derived from the test database, and also a grouped report based on a filtered view of the test database, with the Grouped information coming from a one-to-many relational join to a "sales" table. Times were recorded for three operations: building the report (including time spent processing the table join), previewing to the last page, and printing the report to a file using the Generic/Text Only Windows printer driver. One database, FileMaker Pro, was unable to perform the complex report because its report generator does not support grouping, so we substituted the time taken to run the Join query and printed a columnar report instead.

The final test measures the time required to complete a block update of 1,000 records.

Times for all the tests are weighted to reflect the most common operations in typical database applications.The weightings are used to produce the overall figure, relative to Microsoft Access Version 2.0.

Performance Results

All performance results have been adjusted relative to Access version 2.0

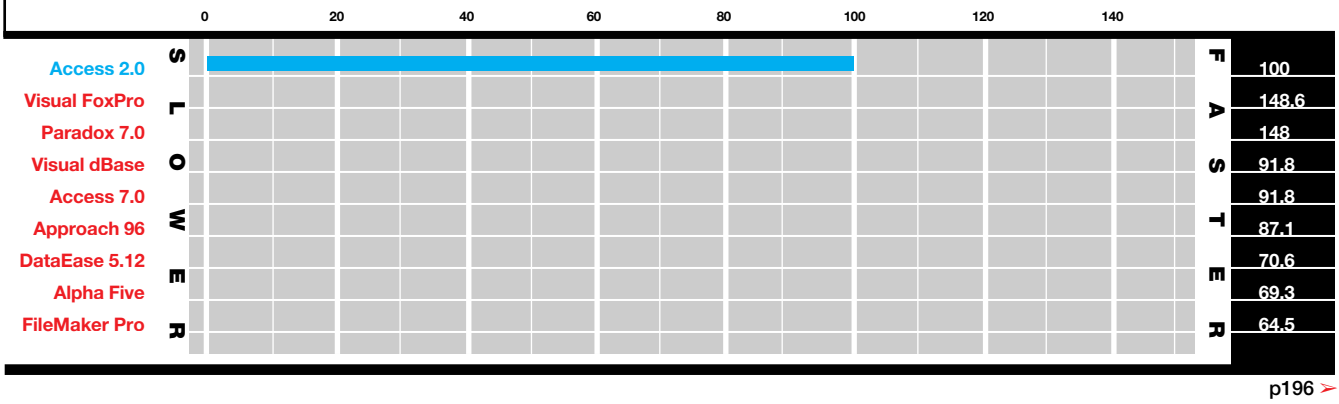

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Table of Features

Product	Access 7.0	Alpha Five 2.0	Approach 96	DataEase 5.12	FileMaker Pro 3.0	Paradox 7.0	Visual dBase	Visual FoxPro 3.0
Manufacturer	**Microsoft**	**Alpha Software**	**Lotus**	**Sapphire**	**Claris**	**Borland**	**Borland**	**Microsoft**
Tel	0345 002000	01752 897100	01784 445808	0181 554 0582	0800 422 322	0800 454065	0800 454065	0345 002000
Fax	0141 226 4197	01752 894833	01784 469342	0181 518 4150	01923 208430	0800 454066	0800 454066	0141226 4197
Technical support	01734 271000	01752 897100	01784 445351	0181 518 3388	01923 208466	01256 373478	01256 373477	01734 271000
Warranty support	90 days*	Lifetime	60 days*	30 days*	60 days*	30 days*	30 days*	90 days*
General Features								
Minimum RAM	12Mb	8Mb	8Mb	6Mb	8Mb	8Mb	6Mb	8Mb
Min & (Max) HD space	42Mb (54)	12Mb (32)	18Mb (32)	10Mb (20)	2.3Mb (8.4)	13Mb (30)	10Mb (40)	15Mb (50)
Min processor speed	486	486	486	386	486/33	386DX	386	386DX/25
OLE 2.0 support	●	●	●	No (OLE 1.0)	●	●	●	●
Prog. language	VBA	None**	LotusScript	DQL	Script	Object PAL	dBase	FoxPro
Compiler	❍	❍	❍	❍	❍	●	●	●
Graphs	●	❍	●	❍	❍	●	●	●
Address labels	●	●	●	●	●	●	●	●
ODBC compliant	●	❍	●	● (optional)	●	●	●	●
Next version in beta	●	❍	●	❍	❍	❍	❍	●
Sold with office suite	Microsoft Office	None	Lotus	None	None	Corel's	None	None
			SmartSuite			Perfect Office		
OS Details								
32-bit app	●	●	●	❍	●	●	❍	●
Win95 version pending	n/a	n/a	n/a	●	n/a	n/a	n/a	n/a
Supported platforms	Win95/NT	Win95/3.x	Win95/3.x	Win 3.1	Mac, Win 3.x/95/NT	Win95/NT	Win3.1/Win95	Win95/3.x/NT
						DOS, OS/2		

● Yes ❍ No

* From day of first call

** Scripting language will appear in the developer's version (2.0)

Editor's Choice

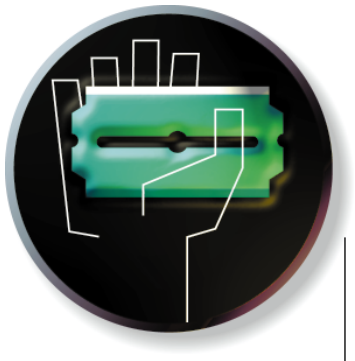
Fully-fledged programming tools like Visual FoxPro and Visual dBase are at the high end of the products here. Paradox and Access are also developer applications capable of creating fully-functioned custom applications, but they are also packed full of end-user tools and features such as wizards and ready-made database solutions. At the other end of the spectrum, there are packages tailored for the needs of the end-user, like Alpha Five, Approach and FileMaker Pro.

Each database system has been tested using our VNU European Labs benchmark tests. The overall scores have been expressed as relative figures compared to Microsoft Access version 2.0. Although performance scores are not the all-important factor when it comes to deciding on the best database package, they are a significant consideration, especially for the higher-end packages which will need to handle large volumes of data efficiently. Other important considerations include the degree of functionality offered by the programming language, and the overall ability of a package to serve the needs of its target market.

If you're looking for a powerful programming package, FoxPro is the clear winner in this round-up and earns itself the Editor's Choice award in the developer's category for its excellent visual design tools. FoxPro provides a rich object-orientated programming environment, combined with serious power and the ability to take advantage of the Windows 95 interface and 32-bit processing. Living up to past performance, FoxPro's benchmark scores were exceptional, and despite the product's uncomfortable market position, it is still unrivalled as a powerful database development tool.

When it comes to the sheer power required to handle large volumes of data, Paradox deserves a special mention. Functionally, Paradox contains some major improvements compared to version 5.0 and is now a fully 32-bit application.

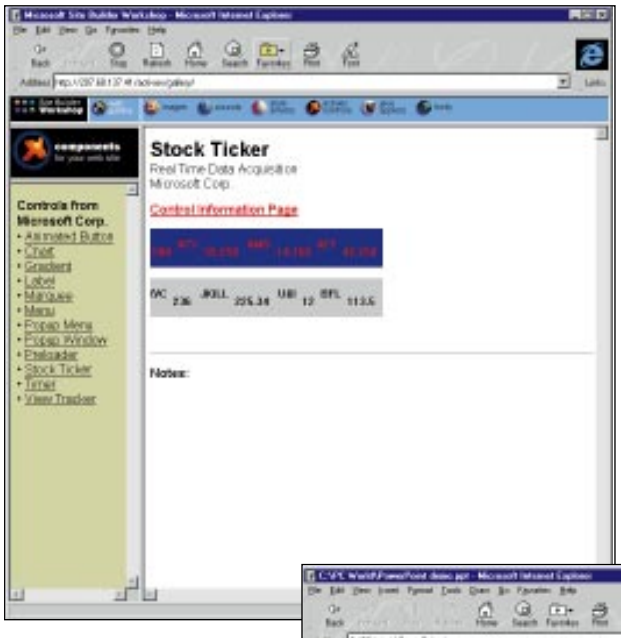
In the end-user category, the obvious winner of Editor's Choice accolade this year is Lotus Approach, which has been developed from the ground up to serve the needs of the non-expert. It is still by no means a developer's package, but manages to combine powerful data analysis tools with some sophisticated end-user features. Approach already has a strong market identity as an end-user database, and looks set to become more important as a client/server tool as IBM integrates the product with its existing systems. With Approach now being bundled with DB2 for Windows NT, it looks set to become the graphical front-end for the entire DB2 family.



Netscape **fights back**

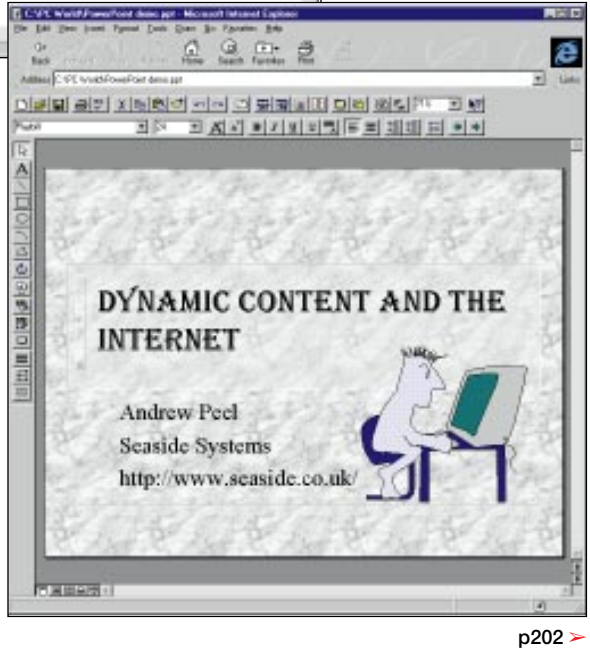
What is Netscape doing to maintain its position and fight off the challenge from an aggressive Microsoft determined to take 40 percent of the browser market by the end of 1977? **Andrew Peel** finds out.

Despite a two-year head start on Microsoft, Netscape Communications cannot afford to rest on its laurels. It knows that Microsoft is on its tail, and probably won't take two years to catch up. Indeed, Netscape estimates it is now only six to 12 months ahead of Microsoft, while others might say it is already in danger of being overtaken. Certainly, Microsoft is in such a strong position that it can throw staff at a project if that's what it takes. And if it can't build it itself, it'll buy a company that can or already has. Just look how it has implemented the Java Virtual Machine and related internet technologies in very little time.



Left An example of the ubiquitous stock price ticker-tape, only this time it's an ActiveX Control

Below Internet Explorer hosting an ActiveX Document — some PowerPoint slides, in this case



The rise and rise of the intranet

In 1993 there were just 130 web servers on the internet. By the end of 1995, there were estimated to be 120,000. The growth of the web is based on its use of open standards such as TCP/IP, HTTP and HTML which make it platform-independent. Any hardware or software manufacturer can build web servers that talk to the Hypertext Transfer Protocol (HTTP) and clients that can interpret the Hypertext Markup Language (HTML).

With the proliferation of PCs and networks within companies, the web is an obvious choice for setting up an in-house information system, or what Netscape calls the "Full Service Intranet". IDC suggests that by 1997, 80 percent of web servers will be used for internal sites, or intranets. A report by Input, a Californian research firm, predicts the combined corporate internet and intranet market will grow from $12 billion in 1995 to $200 billion by the year 2000. Both Netscape and Microsoft realise that intranets are a huge growth area and have announced their intentions to focus on intranet products.

The web provides intranets with the same benefits it provides the internet: the ease and speed of publishing information electronically. But with an

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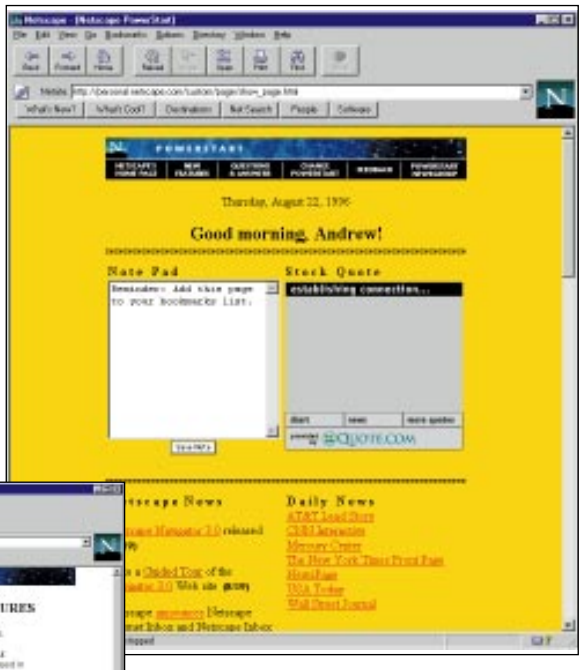
intranet the benefits are much greater. Whereas most web sites on the internet are 90 percent advertising and ten percent customer information, internal webs contain far more useful information. Company announcements, discussion groups, email and sales figures can all be available with a simple point and click within your favourite web browser.

The rewards of moving away from paper-based communication are endless, but of course there is no such thing as the paperless office. As has long been understood, the problem is a cultural rather than a technological one, but as the figures from Input suggest, company information is increasingly being left to electronic systems.

Right **Netscape's PowerStart, complete with stock price ticker-tape**



Below **Some of the new features in version 3 of Navigator: borderless frames, multi-column displays, font control and coloured table cells**

The clients

With its browser software, Netscape aims to provide a single front-end to all internal and external resources with what it terms the "Universal Client". However, Microsoft has a huge advantage here with its ActiveX set of technologies (see page 208). Via ActiveX, Internet Explorer can support ActiveX Documents such as Microsoft Word documents — quite handy when you consider than Microsoft rules the world of word processing with a whopping 80 percent market share, and also that many of the documents that a company might want to publish on its intranet will already exist in electronic form, courtesy of Word.

Not wanting to be too greedy though, Microsoft supplies an ActiveX plug-in for Netscape's Navigator. Funnily enough, the sentiment has not been reciprocated. Microsoft was left to build its own implementation of Netscape's JavaScript for IE, as well as being designated builders of the Java Virtual Machine reference implementation for the Windows platform by Sun Microsystems. Microsoft took the opportunity to "extend" Java by building in hooks for ActiveX, receiving much criticism in the process.

Microsoft also implemented Netscape's cookie technology for IE. This is the system whereby user preferences are made persistent by storing them on the client side, so removing the need to store data centrally and the complexity that entails. The cookie remembers where on the web it originated from, and its contents are sent to the originating server when the user returns there.

A revealing example of cookie use is in Netscape's PowerStart, which can be reached from the Netscape home page. PowerStart allows a user to build a personalised web page that is individual to

Netscape's strategy

What makes Netscape, a relatively young company, think it can keep ahead of Microsoft, the 20-year-old giant? According to Eric Broussard, Netscape's European marketing manager, based at the company's HQ in Mountain View, California, users will decide. "We aim to deliver the absolute best experience," Broussard explains, extolling the virtues of Netscape's use of open standards to build multi-platform internet and intranet solutions. He goes on to say that Microsoft builds products that "work as best as possible in their own environments [i.e. Windows], whereas Netscape has no bias."

Broussard claimed that Windows 95 and NT are installed on just 30 percent of the world's computers, while Netscape's strategy right from the beginning has been to support multiple platforms. Today, Navigator version 3 is supported on 16, compared to Internet Explorer's not so grand total of two. Quite amazing when you consider that Netscape's staff totals just 1,300, compared to Microsoft's 20,000.

Third parties are working on Unix and Macintosh implementations of IE complete with ActiveX and Java Virtual Machines (the latter implemented as an ActiveX control itself, as with 95/NT). Microsoft claims the ports will be complete by the end of the year, but will the non-Windows versions of IE lag behind the Windows versions? Microsoft has still got a lot of catching up to do before it can release multiple versions simultaneously, as Netscape does.

Broussard says Microsoft is "protecting its operating system, and is pushing agressively," but is not working with open standards. He draws an analogy with the telephone business, explaining that many different types of hardware are built by many manufacturers, and yet the fact that they are based on the same, open standard means that any telephone can be used on the network. He says that Netscape's philosophy is that any site, anywhere is the world, should be able to be viewed in the same way. On this point he mentioned that an ActiveX plug-in is available for Navigator, as if to say "anything you can view, we can view better", or at least the same.

On Netscape's strategy for the future, did he think Netscape was relying too heavily on Java for many of its products and technologies? "We need to be worried about being leapfrogged, as Microsoft was by the internet," says Broussard. He continued to say that, at the moment, Java has a huge momentum, and Netscape is building on that with more open standards. Broussard says the three main areas for future Netscape product development were more integration, better usability and more server technology

Netscape has a headstart over Microsoft on internet technology, and at the same time is a fraction of the size, making it more flexible — a huge advantage in today's ever-changing IT industry.

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them. On successive visits by the user they receive the same page, tailored the way they specified previously. Details of what the page contains is stored on the user's machine and sent to the PowerStart server when it is visited. PowerStart uses that data to create an up-to-date version of the user's page. Various attributes and functionality can be added, like changing the background colour, adding a list of frequently-visited links, the latest news stories in the user's areas of interest, and yes, you've guessed it, a stock price ticker-tape.

Other innovations in the current version (3.0) of Navigator include better Java and JavaScript support, including an implementation of the Java Virtual Machine for Windows 3.1, plug-ins and LiveConnect, all of which Netscape claims provide "intelligent compelling content" on web pages, although some might disagree.

There are also tools for collaboration (including CoolTalk, a version of Internet Phone), chat, a shared whiteboard and multimedia (with integrated support for audio, video and the latest version of VRML (2.0) from software called LiveAudio, LiveVideo, and Live3D respectively). There is an administration kit which lets corporate customers specify and lock Navigator settings centrally.

Both Netscape and Microsoft claim to have the least monolithic browser (users now have the choice of whether to download a cut-down or fully-fledged version of Navigator), and with both companies releasing version 3 of their respective browsers, both claim to have the fastest Just-In-Time Java compiler. Netscape has nonetheless made sure of multiple platform implementations of Navigator. 16 exist to date.

Orion

User services	Network services
Information sharing & management	Directory
Communication & collaboration	Replication
Navigation	Security
Application Access	Management

Netscape sees the Full Service Intranet as consisting of two areas of focus: user and network services

Galileo

Galileo is the codename for the next version of Netscape's Navigator. Netscape's goal with its client/server pair is to "match proprietary groupware alternatives like Lotus Notes in functionality, while surpassing them in flexibility, ubiquity and value".

One of the main areas for groupware products is distance learning, where discussions with fellow students take place electronically. It is important that newsgroups and email can be downloaded and read offline, saving large telephone bills.

This is one of several features that will be available in Galileo. Others include increased email security through S/MIME, automatic loading of plug-ins, increased functionality for trusted Java applets as well as improved Java performance and access to built-in client classes.

Access to built-in classes is part of the Netscape Open Networking Environment (ONE) and can also be found in the Orion servers. Netscape is giving developers access to the internals of their client/server products. The effect is one of providing a huge hierarchy of library functions for software reuse, so allowing the developer to build on tried and trusted code. Galileo will also have improved presentation, with more customisation of the user interface possible. There's quite a way to go before it can match Microsoft's groovy user interface for IE, however.

Who's serving who?

Recent figures from Netcraft say Apache, the free Unix-based web server has 36 percent of the market, followed by NCSA with 17 percent, Netscape with 14 percent and Microsoft's Internet Information Server (IIS) with about 5 percent.

There will always be companies that would rather build intranet application software on top of free software such as Apache, but the majority will want to buy a package off the shelf. Ever since Netscape first started giving away Navigator, people were curious about just how they intended to make any money. "From server software," they replied.

The current version of SuiteSpot is very impressive. Consisting of a collection of

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URL references

Netscape www.netscape.com/
LiveConnect communication
home.netscape.com/eng/mozilla/3.0/handbook/javascript/moja.html
Intranet strategy whitepaper
home.netscape.com/comprod/at_work/white_paper/intranet/vision.html
Netscape ONE whitepaper
home.netscape.com/comprod/one/white_paper.html
Microsoft www.microsoft.com/
ActiveX gallery
www.microsoft.com/activex/gallery/

servers, it provides, among other things, a staging server (for production of information offline from a live server), multiple author support and a graphical site manager (with drag and drop, wizards, etc.) Orion is the codename for the next version of SuiteSpot, Netscape's integrated family of servers, due for rollout over the next twelve months.

Perhaps the two least obvious terms in the diagram are Directory and Replication. Directory services centrally track and manage any object on an intranet, whether it is a user or the access permissions for a particular file. Galileo and Orion both use the Lightweight Directory Access Protocol (LDAP) to provide and query directory services. Replication is the distribution of data across an intranet, contributing to a reduction in network bandwidth required, and introducing redundancy.

As with Galileo, Netscape aims to achieve "full functional parity with proprietary email and groupware alternatives", via extremely powerful clients and servers based on open standards such as TCP/IP, HTTP, SMTP and NNTP. The use of these standards make the Netscape intranet software scaleable to the internet, as the protocols are common to both environments; the benefit being that an information publisher can move from producing material for the intranet to the internet without any extra training. Data on the intranet may even be made directly available to the internet by changing its position or access permissions.

Orion will consist of a version of LiveWire Pro with support for project management, along with updated versions of the Enterprise, Mail, Catalog, News and Directory servers. New to Orion will be Certificate and Proxy servers, to contribute security and replication respectively. The list of features to be added to Orion is endless, but some of the highlights are email tracking and receipts, and server-side mailboxes and intelligent agents based on user profiles. Netscape is hoping that the main additions of replication, agents, and "APIs for everything" will sway companies towards using the next version of SuiteSpot to construct their intranets.

That's the way the cookie crumbles

Cookies, as we have seen, are just one example of how Netscape envisages the future. The two main strategies seem to be Customisation and Intelligence. As the cookie technology demonstrates, keeping user preferences gives users the impression that they are in control. They can be supplied with just the information they require. Profiles of individual users can be built up that allow providers to target individual groups, say for advertising a new product. A one-to-one relationship is created

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ActiveX versus LiveConnect

Internet Explorer 3.0 is the first product that really shows off ActiveX technology. It supports:

- ActiveX Documents (e.g. Microsoft Office files — see *PCW* September).
- ActiveX Controls (pre-built software components, of which Microsoft claims over 1,000 already exist); and
- ActiveX Scripting (used to link groups of ActiveX controls and/or Java applets).
- ActiveX is essentially OLE (Object Linking and Embedding), slimmed down to make it lighter, more portable, and quick to download over a network.

Netscape has its own system for linking software components within the Navigator browser (and also on the server-side, with the Enterprise server). Called LiveConnect, it allows JavaScript to interact with Java applets and vice versa.

But problems exist for both…

- ActiveX is currently only supported by Windows 95/NT. Microsoft plans to make ActiveX both cross-platform and open by a) providing Macintosh and Unix implementations, and b) submitting ActiveX to an independent standards body.
- Because ActiveX uses binaries, versions have to be compiled for each possible platform that a control might be used on. Netscape has made the selection of the correct plug-in automatic in Galileo, but organisation at the producer-end is still a nightmare and not truly platform-independent.
- ActiveX is highly insecure as binaries are downloaded with no code verification as with Java. Microsoft plans to use code signing to verify downloaded code before it is executed, but Netscape argues that this will only verify where the code came from, and not whether it is secure. Netscape fails to mention that their own plug-in system also relies on code signing…

LiveConnect in action: The flashing [sic] text is controlled by the JavaScript buttons embedded in the HTML page

between the consumer and the producer, so creating a stronger sense of customer loyalty.

As for Intelligence, we've seen it planned for Orion, and Netscape is introducing agents into many of its server products. These automate many tasks, from document writers automatically being sent an email when a document has been updated, to intelligent filtering of discussion groups. The intention is to reduce the burden of information on the user. Expect agents to become more prevalent over the next few years, although it may be some time before they are capable enough to take over completely from the manual trawling of information.

Developer city

As for the web software components battle that is just starting to break, the field is still wide open. ActiveX is limited to 32-bit Windows platforms, with more implementations in the pipeline, and the Java Beans API (for building Java components) is not released until at least September. Meanwhile, the Object Management group has just announced that OpenDoc is to become its standard API for distributed document components. In the long term though, Netscape ONE's supporting of IIOP (Internet Inter-ORB Protocol) will stand it in good stead for communicating with other CORBA (Common Object Request Broker Architecture) compliant applications when distributed computing really takes off.

Now that web browsers are becoming operating systems in themselves (just operating at a higher, application level — let's call them Operation Containers), the underlying machine and operating system are unimportant. Platform independence is all. So the question is: is Microsoft trying to protect the dominance of Windows on the desktop by producing the best web browser it can, and giving it away for free? Or, seeing as it is currently building versions of IE for both Macintosh and Unix platforms, is it thinking more of the long term, and, along with Netscape, trying to build the Operation Container of choice for both users and developers? It's quite possible that these Operation Containers will generate more income than the underlying operating systems themselves, seeing as to be successful these days, a single web browser must be available for multiple operating systems. More likely Microsoft is just hedging its bets.

Netscape estimates that the cost of a corporate intranet is less than $40 per user. This is cheaper than either Lotus Notes or Microsoft BackOffice, which are not currently based on open standards anyway. Netscape claims the cost of Navigator and one SuiteSpot bundle for 1,000 clients is $33,000, compared to $170,000 for the equivalent BackOffice setup, and $277,000 for Notes. It asserts extra savings can be made in the way of reduced training and development costs, since Navigator and SuiteSpot are based on open industry standards and Netscape is creating APIs to virtually all product functionality as part of Netscape ONE, giving leverage to developers. This amounts to nothing when Microsoft can easily afford to give its products away in order to gain market share.

Netscape is going to put up a hell of a fight. Netscape ONE has already been given support by virtually all major computer vendors, including Microsoft itself (which doesn't mean that Microsoft won't provide similar functionality with IIS and Explorer).

Netscape has been busy putting together a complete software package for any company that wants to provide information over intranets that is scaleable to the internet. Along with the transaction-orientated products such as LivePayment and Wallet, Netscape provides an information system ready to run, yet simple to build upon. Nowadays, software is not necessarily enough. Netscape plans to double its 24x7 technical support in the next six months, while its DevEdge developer programme already has 12,000 members.

Netscape is counting on open standards and Java to carry them through what could well be a very rough patch in its company history. May the best (or at least the most powerful) company win!

PCW Contacts

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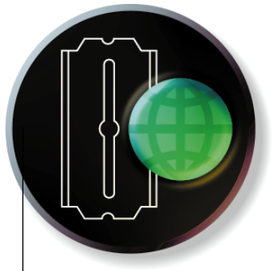


Cut **loose**

JavaScript is a “loose” scripting language that lets you do some of the things that are too complex to do in Java. In the first of a two-part tutorial, Jim Smith gets down to basics.

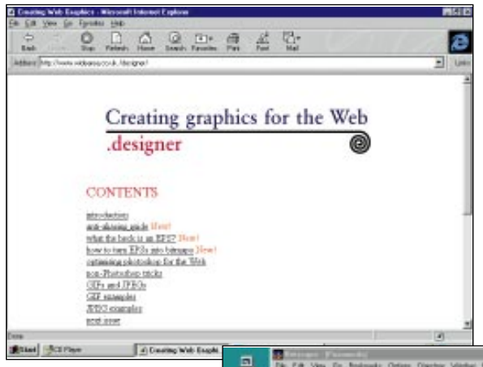
JavaScript has missed out on a good deal of interest because of the all-encompassing role Java has assumed. This is a shame, because now that JavaScript is built in to Internet Explorer as well as Navigator, it provides a relatively simple way of doing things that are either complex to do in Java, like tell the time or manipulate frames, or put an unnecessary burden on your server, such as validating forms input.

Over the next two months I will be introducing JavaScript, hopefully demonstrating how to build engaging user interaction into a web page using simple scripting statements.

QuickIntro

JavaScript is a pretty damned loose language. It’s loosely typed, loosely object-orientated and a little loose around the edges, particularly when it comes to cross-compatibility and creating global variables. Loosely typed means that you don’t have to be explicit about what kind of variable you’re creating. JavaScript treats numbers on an ad hoc basis, so that you don’t have to worry whether your points are floating or whatever.

It’s loosely object-orientated in that you manipulate much of the JavaScript world through objects, and you’re even allowed to create an object or two, but what you can do with them is limited. This object-orientation is where the supposed link with Java comes from: in fact, the two languages are related, but more because both are descended from C++ than any direct genetic association. Indeed, JavaScript was called LiveScript until Netscape decided it would be a cunning wheeze to hijack Java’s hype by changing the first part of its name. And it’s still a little loose around the edges: there are some things that just won’t work across platforms, and some actions are easy to think up but incredibly annoying to implement, such as storing persistent data.



Things to do in JavaScript: Getting to grips with graphics, and designing a password system

Operators and stuff

Much of JavaScript’s basic structure is derived from C++. The operators are pretty much out of the C textbook, starting with the basic arithmetic operators and encompassing negation (!), increments and decrements (++, —) and so on.

This code fragment in Fig 1 demonstrates the operators in action. The comments between are protected from being interpreted by either enclosing them in /* */ pairs or just being on a line beginning with //. It’s good form to hide the contents of your JavaScript as well, using a combination of the HTML comment tags and the JavaScript comments in order to keep JavaScript from being displayed as text in less sophisticated browsers: most Mosaic variations stiill insist on displaying JavaScript.

JavaScript has to be contained within its own <SCRIPT> </SCRIPT> tags as well,

Fig 1

```
DOCTYPE HTML PUBLIC “-//IETF//DTD HTML 2.0//EN”>
<HTML>
<HEAD>
<TITLE>JavaShell</TITLE>
</HEAD>
<BODY>
<!—Demonstrate the JavaScript variables—>
<SCRIPT LANGUAGE = “JavaScript”>
<!— Hide contents from old browsers
number = 0;
/* Assignment is by the simple equals sign. All JavaScript statements
   must end with a semi-colon. But you knew that, right?*/
number = 1 + 1;
// Duh. number now equals two.
number = (number + number) * 3;
// Brackets proceed pretty much as normal;
number = number % 5;
/* The per cent sign stands in for the modulo division operator, so
   number now equals 2 */
number++;
// Increments number by one
document.write(number);
// Writes the contents of number to the screen.
// End hiding. Note that this must also be commented out of
   JavaScript —>
</SCRIPT>
```

and, although Navigator will struggle manfully with your code if you don’t say explicitly what it is, you need to give the first occurrence of the <SCRIPT> tag the attribute LANGUAGE=”javascript”. This is particularly important for compatibility with Internet Explorer, as Microsoft’s preferred scripting language, which can also appear within <SCRIPT> tags, is also Visual Basic.

The little document.write(‘something’) incantation at the end is our first brush with an object and a method, but for the sake of argument regard this as just a PRINT command for now. Note also that you’ll need to paste the contents of this page into an HTML page to run it.

Conditional love

JavaScript would be a pretty poor language if it didn’t have a way for you to control the program flow in relation to input variables. JavaScript’s conditional tests follow the C model. We’ll just look at the If test.

The grammar for the If test goes like this:

```
if (this is true
   {
   //do the thing in curly
brackets
   }
```

Naturally there’s an else to go with this should you desire it:

```
if (this is true)
   {
   //do the thing in curly
brackets
   }
else
   {
   //do something else
   }
```

Note that as if and else are only the beginnings of statements, they do not need a semi-colon after them.

JavaScript also uses the C convention that simply placing a variable in brackets after an if is equivalent to testing its truth, so

```
if (pope_a_catholic)
   {
   document.write(“And bears
doodah in the woods”);
   }
```

tests to see if the variable pope_a_catholic is true and, if it is, displays a useful nature observation on the screen.

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Fig 2

```
function addHello(secondword)
/* We tell Netscape that we're declaring a function, what it's called
and what we're putting in to it. Note that there's no semicolon
after the declaration.*/
        {
        var phrase = secondword;
        // Declare local variable phrase and assign the contents of
firstword to it
        phrase = "Hello " + " " + phrase;
        // The + operator stands for concatenate in strings
        return phrase;
        // Send it back to addWeb
        }
function addWeb()
// AddWeb doesn't take any arguments.
        {
        var slogan = "Web";
        // Makes a variable containing the word Web
        var finalphrase = addHello(slogan);
        /* This passes the contents of slogan up to addHello which then
passes the bolted together phrase back to this expression to become the
contents of finalphrase. */
        return finalphrase;
        }
        // Passes finalphrase down the program to the following
webslogan = addWeb();
// Which then passes it into our generic PRINT statement
document.write(webslogan);
// Writes the contents of webslogan to the screen
</SCRIPT>
```

Loop the loop

JavaScript is extremely C-like in its approach to conditional loops. The most common loop you'll use is the simple FOR...NEXT style loop:

```
for ( x = 1; x <= 10; x++ )
    {
    // Perform the action between
curly brackets
    }
```

The bracketed section first initialises the variable we're using to run our loop to one, then sets the condition to "while x is less than or equal to 10", then sets the amount to be incremented by to one on each iteration. This loop will keep repeating until x is equal to 11, and will then release the program to go on its way.

There are other loops, and ways of conditionally testing situations such as the while loop and the switch (?), but space permits examination of only a few. Refer to Using JavaScript or the Netscape web site for the others.

Variables and functions

JavaScript can handle most variables you can throw at it, generating them simply when you first define them. It's more polite to declare them first by prefacing the variable name and type with var but JavaScript can deal with variables created on the fly.

Functions are fairly C-like, too. You declare these with the keyword function, the name of the function and any variables you want to pass to it. Inside functions it's good practise to declare your variables with the var keyword: this makes them local to the function, not global to the whole page.

The code fragment in Fig 2 prints "Hello Web" (well...) by concatenating two strings held in separate functions. Note that functions have to be defined before they can be called, so addHello is defined before addWeb although it's not called until addWeb is run.

Objects

Objects are not as tricky to understand as some object-oriented languages might lead you to believe. Particularly not in JavaScript as there are only two things you can put into an object: variables, which are called properties in the object world, and functions, which are called methods.

Fig 3

```
// Tell javaScript to assign car
        {
        this.door = colour;
        this.windscreen = shatterproof;
        this.engine = horsepower;
        this.seatcover = number_of_beads;
        }
```

Objects are simply containers for holding this information. An object consists of an object name, followed by its property or method name. For example, let's make car an object. Parts of a car include doors, windscreens, engines and those bead things taxi drivers use. These are properties of the car object. Each property can have a value, just like a variable.

To declare an object in JavaScript we list its properties out.

Note that this is just JavaScript shorthand for "the object this declaration is about". It can also be used inside program loops for convenience. The code fragment in Fig 3 gives us a set of objects and properties. In this example these are car.door, car.windscreen, car.engine and car.seatcover.

You'll have noticed the deliberately confusing keyword Netscape chose to declare an object with at the top of that fragment: function. JavaScript does indeed regard objects as functions — that's how you pass variables to it, after all. However, an object is more than just a vanilla function. Let's get even more confused — an object can be an array as well.

In the example the names of each property can be replaced with an array index (starting at 0) so that each property can be accessed in sequence. So, car.door is the same as car[0], car[1] is the same as car.windscreen and so on. This is handy when you want to access each property of an object in turn without knowing the precise name of each variable. In later articles we'll come across the rather Buddhist (or quantum, if you prefer) notion that everything in our JavaScript program is just a property or method of a single object, the window object. Each property can have subproperties, so in the example we could have car.engine.cylinders, car.engine.torque and so on.

The second type of code that you can put into an object is the method. To all intents and purposes these are they same

Fig 4

```
<SCRIPT LANGUAGE = "javascript">
function toot()
        {
document.write("Parp parp said Mr Toad");
        }
function car(colour, shatterproof, horsepower, number_of_beads)
        {
        this.door = colour;
        this.windscreen = shatterproof;
        this.engine = horsepower;
        this.seatcover = number_of_beads;
        this.horn = toot;
        }
cortina = new car("red", true, 120, 2000);
/* Creates a new instance of car, called cortina. This inherits all of
car's attributes */
cortina.horn();
// Calls the horn method
</SCRIPT>
```

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Fig 5

```
// Put this function in between the <HEAD> tags to hide it.
function MakeArray(size)
        {
        this.length = size;
        for(var i = 1 ; i <= size ; i ++)
                this[i] = 0;
        return this;
        }
</SCRIPT>
<SCRIPT>
<!— Hide JavaScript
colorArray = new MakeArray(16);
colorArray[1] = “000000”;
colorArray[2] = “111111”;
colorArray[3] = “222222”;
colorArray[4] = “333333”;
colorArray[5] = “444444”;
colorArray[6] = “555555”;
colorArray[7] = “666666”;
colorArray[8] = “777777”;
colorArray[9] = “888888”;
colorArray[10] = “999999”;
colorArray[11] = “AAAAAA”;
colorArray[12] = “BBBBBB”;
colorArray[13] = “CCCCCC”;
colorArray[14] = “DDDDDD”;
colorArray[15] = “EEEEEE”;
colorArray[16] = “FFFFFF”;
for (count = 1 ; count <= 16 ; count++)
        {
        document.bgColor = colorArray[count];
        }
//End hiding in the shadows: one day JavaScript will speak its name out
loud...//—>
</SCRIPT>
```

as functions, except that they belong to an object. In the very first code example we came across one of this phylum: document.write(). What we have here is a method that belongs to the document object that takes whatever you put between the brackets and displays it in the document. So, we could add a method to our car object (Fig 4).

Handlers

So far we've not been able to interact with our JavaScript. It's just loaded, executed and then gone all inert. To provide interaction we need to introduce some new elements: event handlers. Event handlers make your program perform some action when the user chooses to manipulate some portion of your page, whether it's putting data into a form element or simply letting the mouse pass over a hotlink.

In fact, you've probably already come across this example. By adding the onMouseOver attribute to a URL with a bit of JavaScript attached, you can make the status line (the bottom of the window where the URL usually appears) contain your description of the upcoming site instead, when the user holds the pointer over your link:

```
<A HREF=”link.html”
onMouseOver=”window.status='Some
text appears in the status bar';
return true”>
```

Event handlers are technically pieces of HTML, not JavaScript (they pass information to JavaScript or instruct it to do something), which has two effects. Firstly, they are not case sensitive so we could have written that as ONMOUSEOVER, but keeping it looking like a function makes the page easier to debug. Secondly, the contents of an event handler have to be encased in double quotes, so any quoted strings inside have to be encased in single quotes or the JavaScript will attempt to return too early, giving us one of those embarrassing JavaScript error dialogues.

Event handlers that relate to the action of the mouse include the easy-to-understand onClick and onMouseOver. Other event handlers relate to the content of forms. If a user selects an input element then the onFocus element can be called. So, if I were designing a password system, I could make the program throw up a “Don't forget to keep your password secret” alert when the user clicked or tabbed to the password input box.

onBlur does the reverse: it calls a piece of JavaScript when the user clicks elsewhere, removing the highlight from the input box. This is a very useful event handler if you want to verify someone's input after they made it. We'll be doing this next month.

There is another way to get interaction into your page. JavaScript can be called as a URL. The format is

```
<A HREF=”javascript:
whatever(function)”> Item </A>
```

This has the nice side effect of letting you design interactive pages with attractive, clickable buttons simply by replacing Item with an image tag.

That concludes our swift look at JavaScript. Next month we'll use these components to build a self-validating form in JavaScript, and then use the contents of that form to create a navigation window that floats above the main window that has been created on-the-fly by JavaScript to the user's spec. In the meantime, here's a JavaScript with a retro flavour (Fig 5). Remember fades, where you could fool Navigator into displaying different shades of background colours one after another? Well, this does just that, in JavaScript.

PCW Contacts

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net.news

Around the web world with PJ Fisher.

Netscape delivers personal newspapers

■ Netscape and more than 30 content providers, including the *New York Times* and *HotWired*, have joined forces to pipe personalised content to Navigator users.

With the new Netscape Inbox Direct email, add-on users will be able to download sections of the *New York Times* in HTML format. Normally, some of the content is charged for, but Netscape claims that the deal will deliver over $1,400-worth of content free to users of Navigator 3.0 if they choose all the providers.

The content is US-based and InBox adds yet another layer to Netscape's program group. The service is scheduled to begin this month.

The Internet Inbox is designed to integrate the transmission of multimedia with news and mail services across all platforms. Users can send email containing HTML formatting with sound, graphics and Java applets.

Netscape is also working on a version of Navigator for Macs that will take advantage of Apple's OpenDoc technology, including CyberDog software which acts as a container for active elements. Apple will bundle the new browser with all new Macs but a release date has not been set. The new version of OS/2 Warp (codenamed Merlin) is due for release at the end of October. Merlin uses speech recognition technology, but no announcement has been made as to whether Navigator will be able to take advantage of this.

■ See Cutting Edge Focus p201

Take stock of your shares for free

■ Microsoft has signed a deal with the *Wall Street Journal* (WSJ), to allow users of Internet Explorer 3.0 free access to the online edition of WSJ until the end of 1996. It normally costs $49 per annum.

Astound knows no bounds

■ Presentation software specialist, Astound, has put a free beta of a new web tool on its web site, claiming that this tool can create instant Java applets.

WebMotion is said to be the easiest Java applet builder and requires no programming knowledge. It uses a path-based editor with VCR-like controls to create flashing banners, animated logos, and buttons.

Aimtech's Jamba offers similar functionality but allows more complex Java applets to be built. Instead, Astound is pitching WebMotion against MacroMedia's ShockWave and lists a number of advantages over Shockwave including an automatic installer to server, an animated clipart collection, automatic generation of HTML and animated GIF tools.

When fully available, WebMotion will cost around $99. The betas are timed-out versions, but each new one will have extra features added as Astound works toward the final version.

www.astoundinc.com

Sony to launch WebTV by Xmas

■ Despite doubts about the product's viability, Sony is going ahead with the United States launch of its proprietary WebTV terminal, in time for the Christmas shopping period.

The WebTV is designed to sit next to the television set and connect via a SCART or S-Video cable. Connections to the phone networks is via a standard modem cable.

Sony has signed a deal with WebTV Networks to manufacture the boxes, and WebTV Networks will sell access via subscription.

Mitsubishi is set to launch a complete web TV in the US next year.

This will be a normal TV with a modem device built in, with web access available via buttons on the remote controller.

Meanwhile, Netscape is reported to have taken a stake in a start-up company called Navio, which is developing versions of the Navigator browser to run on non-PC devices such as set-top boxes and games consoles.

www.sel.sony.com/SEL/webtv/index.html

5Mb free for Demon diallers

■ Demon is offering its dial-up customers 5Mb for free. The new Homepages service will allow Demon users to create their own web sites using up to 5Mb on Demon's servers. They will receive a personalised URL in the form of www.nodename.demon.co.uk (where nodename is the name of the customer's own account).

The company says that because it allows for an unlimited number of email users on each machine, all family members can have their own web sites provided they do not exceed 5Mb in total.

Users will also be able to exploit four universal CGI bins which will allow them to put a counter, an imagemap, and a mailform on their sites.

Demon states that it will not restrict customers' use of web space, so they can be used for commercial purposes: hence the CGI bins.

"We do not restrict customer dial-up accounts, so why should we restrict the use of their web space?" said Demon.

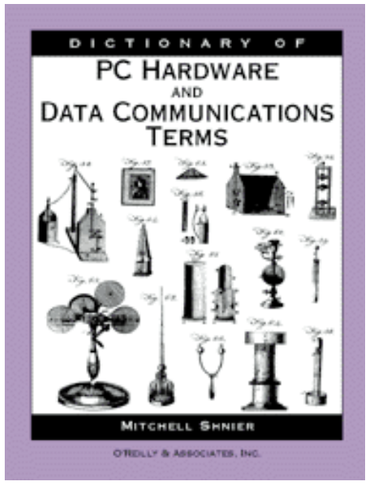
The company further claims that this service is unique, and that no other ISP offers a virtual web server free to its dial-up customers.

Demon 0181 371 1000
www.demon.net/www/

OUP paralyses the net pirates

■ Oxford University Press may have cracked copyright abuse on the internet. It is using an encryption system to ensure that electronic books sold over the internet cannot be pirated.

OUP is using an encryption system from Ç-Dilla which enables users to buy complete electronic copies of its classic physics text books. Individual chapters can be purchased in this form of publishing-on-demand.



The books are held as encrypted Acrobat PDF files which need a special version of Adobe Acrobat Reader. This must be downloaded from the OUP web site along with the Ç-Dilla software. An introductory file is available unencrypted, containing the title page, foreword and introduction table of contents free of charge.

Further chapters can be downloaded and buyers are asked to contact the OUP sales desk to receive the unlocking code. The code is unique to a single user's PC, and the Acrobat reader cannot create copies of the chapters. Complete books cost £20 each, while chapters are £3 each.

In a similar experiment, O'Reilly & Associates has the entire text of its new *Dictionary of PC Hardware and Data Communications Terms* online, which is accessible for free. All the terms form part of a searchable database.

www.oup.co.uk/physics_online
www.ora.com/reference/dictionary/
www.c-dilla.co.uk

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Wired for mound

A digitally-wired team of mountaineers have scaled the three highest peaks in the UK while broadcasting their exploits directly to the net.

In addition to the usual ice picks and climbing ropes, the kit included notebooks, GSM mobile phones and digital cameras.

The team, from the Livingston computer hire company, were able to transmit pictures of their expedition directly to Livingston's web site.

In a picture transmitted to the web site, the team are shown (*above*) at the summit of Sca Fell.

www.livingston.co.uk

Explorer's Christmas cracker

Microsoft's acclaimed Internet Explorer 3.0 (IE 3.0) is expected to be released as a sell-through package with a number of extra goodies including Internet Mail & News, NetMeeting and SoftQuad's HiP intranet publishing software product, for around £15. Look out for it in the shops before Christmas.

IE 3.0 will continue to be available as a free download from the Microsoft designated web sites.

Meanwhile, Internet Explorer 4.0 has just gone into beta and is available for those who wish to turn their Windows 95 desktops into browsers.

www.microsoft.com/ie

Mobile access to the internet

Vodafone users who have an account with UUNet Pipex can now access the internet from their mobile phones. By using the short code 976976 and a notebook (or even a desktop) linked to a digital Vodafone, they can access email at speeds of up to 9,600bps, the company claims.

Buyers of the new Nokia 9000 Communicator are being targeted by UUNET Pipex with a card offer to register for a PIPEX Dial account. Once applied for, the company will send a Telenote (short text message) that will configure the communicator for use with the Vodafone Pipex Direct Link and confirm the account.

Vodafone stated that accessing Pipex in this way is quicker than a normal dial-up, as it cuts out the POP and is only charged at the standard rate. The service is aimed at business buyers.

HexWeb aids Xpress html

Users of Quark XPress have a new web tool at their disposal with the release of HexWeb from Xtension specialists, Xchange International.

HexWeb XT converts Quark XPress documents to HTML, and enables designers to create a web server structure from within Quark XPress.

Other features include an Automatic Frames generator and direct conversion of Quark tables to HTML tables. HexWeb includes HexScape XT, another Xtension which supports Java and ShockWave files so that multimedia elements can be previewed within XPress prior to a full export to HTML documents.

HexWeb 2.1 costs £349 (plus VAT) with special upgrade prices for users of PageMill and BeyondPress, both rival packages.

Xchange International 0171 637 2966

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Infinite variety

■ Fans of William Latham's computer-generated art can try out the Organic Art real-time 3D evolutionary image generator, created by technical guru Mark Atkinson and computer artist Latham. A free demonstration is available from the Artworks web site.

The full release will comprise a complete 3D designer application, allowing users to create their own 3D textures and scenes. It has 70 pieces of backdrop artwork, 54 3D shapes, and 100 texture maps with a point-and-click interface. The 175 screen-savers included can generate an infinite number of genetic variations, so they are different each time they run.

www.artworks.co.uk

Web women on the increase

■ According to Forrester Research, the number of women online is set to soar to nearly nine million by the end of this century. Yet today, only two million are reported to be online. "Women aren't technophobes to the extent that some people think," says the report.

Net surf

Here's something completely different

■ Monty Python's web site is stupid, a waste of time, utterly pointless… and the best new site this month.

Its sparse design featuring Terry Gilliam's quirky line drawings (all in black and white) make it a fast download, and the ActiveX components mean that IE 3.0 users get to play some cute games based on famous Python incidents. Remember the flying cows? And the Black Knight? They're here in the form of some silly, keyboard-driven games.

Netscape users will have to download the usual plug-ins before they can play them. Poor things.

www.pythonline.com

Beat the bills with an offline browser

■ Web users with a less-than-superfast internet connection (I.e. anything below a T1 leased line) become weary of reading about the latest whizzy web sites, only to find that, when they log on, they are such bandwidth-hoggers that most people can afford neither the time nor the money to watch them crawl into their web browsers.

An increasing number of vendors have recognised the problem and have developed offline web browsers. The idea is simple: software can read and download entire web sites including all the graphics and cool add-ons such as Shockwave and Java applets, faster than any human. It's the same principle that AgentWare's Autonomy search tools use when searching the web. Once the sites have been downloaded to the hard drive, they can be browsed at leisure without incurring huge phone bills.

Web Whacker is perhaps the best known and has received good press reviews. So-called "Whacked" information is viewed and navigated locally using a browser and is said to be a mirror image of the information on the web.

Web Buddy (from Dataviz) which uses yet another pooch-style cartoon character to promote itself, caches whole sites, but also offers a number of organisational tools to navigate through them. It is also available for Power Macs.

Freeloader is a freebie which also offers automatic update facilities, so if a site has changed since the last visit, Freeloader updates the cached site.

www.agentware.com
www.freeloader.net
www.ffg.com (webwhacker)
www.dataviz.com(web buddy)

Come the revolution…

Acer Contact Information

■ It could be the Taiwanese who kickstart the NC revolution if Acer's plans to release two sub-$500 PCs become reality.

Taiwan's biggest PC maker is planning to release a 486-based Consumer Network Computer (CNC) and a $199 Kid's PC that will use Acer's own Intel-compliant 386 processor. Being something of a bargain, the Kid's PC might also appeal to adults eager to get online at minimum cost, as it includes a CD-ROM drive, memory and input device. No word on a modem, however.

www.acer.com

For Brit browsers only

■ Web users are often frustrated by the US bias of web content. The situation worsens when search engines report non-specific data, forcing users to sift out thousands of irrelevant US-based listings. Tools such as Autonomy's AgentWare have helped, but a new UK-specific search site hopes to attract US data-frustrated users.

The Mistral site was launched at the Internet 96 show and it claims to contain a database of UK sites on the web, including commercial, academic, government and other organisations. Search criteria include the normal keyword search or more specific searches such as URL entry.

uksearch.co.uk

It's a RAID!

■ Mylex Corporation has developed a RAID software package which gives network administrators access to RAID systems to configure and monitor network activity.

Mylex states that its Global Status View software can monitor an unlimited number of servers, or server groups, via standard TCP/IP connections. It will support Windows NT, Windows 95, Netware and UnixWare, and costs around $179.

www.mylex.com

Following **protocol**

Making the right connections, watching your speed, secret messages and anonymous mail, and more — Nigel Whitfield probes your problems and answers your internet queries.

Q *"I have an America Online subscription and would like to use Dial Up Networking to connect to the internet, mainly to use a better offline news reader. AOL says this is not possible but can it be done?"*

A. No, it can't. Although you can use programs like Netscape with AOL, it doesn't provide a true internet connection and newsgroup access isn't provided using a standard news server, either. Connection to AOL is via a protocol of its own and it provides a special winsock.dll file which allows internet information to be passed using that protocol, rather than TCP/IP.

Windows 95 Dial Up Networking creates TCP/IP connections so you can't use it to connect to AOL: its modems answer the phone and speak to the AOL protocol. Fig 1 shows how it's all done, both for AOL and a more traditional internet provider.

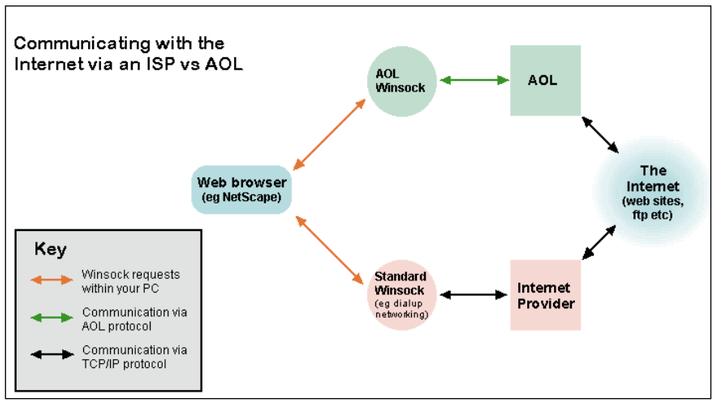

Fig 1 AOL uses its own communications protocol, so although you can use Netscape or other programs via AOL, you can't use the Windows dial-up networking (or another piece of software) to make your connection

POP goes the email

Q. *"The email program I currently use (F1Mail) is rather unexciting. I've been advised by a colleague to use Eudora but Demon tells me that it will not run on my account. Is this correct?"*

A. Sort of. You can happily send email via Demon using Eudora but you can't receive it because Demon delivers mail via SMTP and Eudora is designed to collect messages via a system called POP, typically for a single user at a time. Demon's system delivers messages for all the users in one go when you log on and it's up to your software to sort them into appropriate mailboxes. Although this gives you more flexibility (for instance, you can have as many mailboxes as you like) it does mean that you can't directly receive email using some of the popular programs like Eudora.

Instead, you'll need to use a POP server on your own computer, which receives email from Demon using SMTP and provides a server to which Eudora can talk. One of the popular choices is a program called TPOP. You can find both it and other solutions on Demon's ftp server at ftp.demon.co.uk. There's also a freeware server, that supports six users, available from www.seattlelab.com/.

Signed, Anon

Q. *"How do I send anonymous postings to newsgroups?"*

A. There are two different ways in which to do this, depending on the newsgroup to which you want to post. For some groups, you should check the FAQ and see whether there are people who provide such a service, then all you have to do is mail your message to them and they'll send it out for you with all your details removed.

If you don't feel comfortable with that, you can use an automatic service to post to newsgroups. One of the most well known is the server at anon.penet.fi, which provides the ability to send messages via email and news. To register, you'll need to send email to ping@anon.penet.fi, which will automatically allocate you an anonymous id. A message to help@anon.penet.fi will retrieve full details of how to use the service for both mail and news.

Briefly, you'll need to create a password when you have received your id, by sending another message to password@anon.penet.fi, containing just the password. When you want to send a message via the server, for example to the newsgroup misc.test, you'd post it to misc.test@anon.penet.fi and the message would have to start like this:

```
X-Anon-Password: mypassword_here
```

The rest of your message would go below.

Remember that while the server will try to remove any information that might identify you, like a signature, you should always try a test first to make sure. It's a sensible precaution to turn off the signature in your mail program first, especially if it doesn't begin with the standard two dashes and a space.

Finally, while there's no doubt that anonymous remailers can be useful for lots of people, particularly in support newsgroups, don't abuse them. If you make a habit of sending anonymous posts to newsgroups where people don't think it's warranted (perhaps a comment on last night's TV for instance) you could find that many people are reluctant to enter into discussions with someone who won't even give their name.

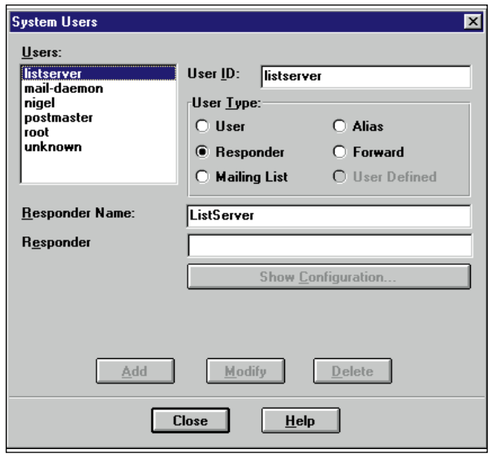

Fig 2 (see *POP goes the email*) SLMail is a freeware version of a commercial pop server, which supports six users. You can use it to make programs such as Eudora work with your Demon Internet account

Speed check

Q. *"How do I determine the actual transfer rate of data, both to and from my modem? I understand that there are many bottlenecks on the internet but how can I even assess the 'quality' of my connection unless I can measure this fundamental property? I connect to CompuServe with a 14,400 baud modem (set to 19,200 in the CompuServe session settings box)."*

A. It's not easy to measure the speed of a connection with most software and modems. There are a number of things to watch out for, however. Some modems have a graphical display which informs you when they encounter an error and "retrain" (the technical term for a process where the two modems renegotiate the speed at which they're talking to each other). If you have a noisy phone line, for instance, you might find that your modem keeps retraining and a connection that started out at 28,800 bits per second (bps) ended up at only 21,600bps. You may also find that your modem has a command that will report the status of the last connection. Such a command is likely to be an option to the ATI command (check your modem's manual for full details): you'd typically tell your software to hang up the link and then use a terminal program like Windows Terminal or HyperTerminal to talk to the modem and issue the appropriate command.

That will only tell you whether or not there were errors, however. To check the throughput, you need to do some more investigation. Some software will tell you the speed at which data is being downloaded but that's not always an accurate measurement. The Turnpike mail and news program is one package that gives these statistics and you should be able to use it with CompuServe, although buying software to check out the performance of your system might be a bit extravagant.

One way to see how well things are working is to use some test files that you can download from your provider. This won't be perfect, but it will give you some idea of how fast things can be sent over the relatively controlled part of the link between you and your provider — though their ftp server or download system might not be running efficiently all the time, of course.

There are a number of things you can test: one is a file that you know won't be

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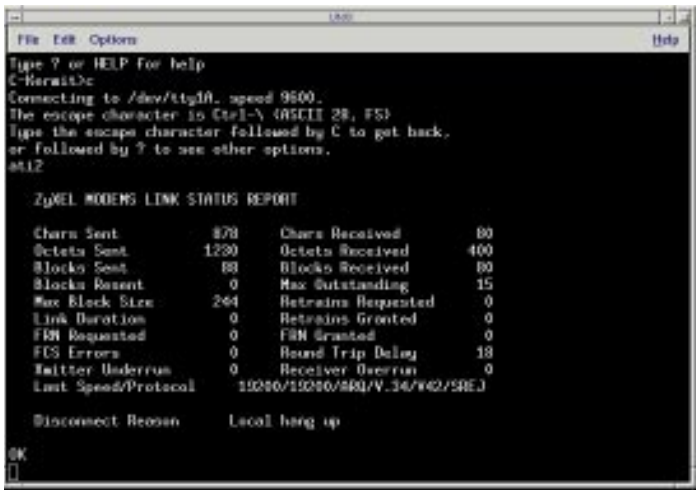

Fig 3 (see *Speed check*) Some modems, like this Zyxel, can report information about the quality of the connection. In the Zyxel's case, use the command ATI2

compressed much, if at all, by the modem, such as a zip file; the other is a file that can be very easily compressed, like a bitmap that's all white or a file consisting of the same letter which is repeated. If your provider supports compression, you'll see a much faster transfer rate with the second file than with the first.

In theory, a serial connection to a modem at 19,200 bits per second can transfer 1,920 characters per second. By working out the speed at which files are transferred, you can express it as a percentage of the theoretical maximum. The uncompressable file will give you an approximation of the actual transfer rate of data over the link between you and your provider, assuming an error-free link. If, for instance, you transferred such a file at 1,200 characters per second (cps), it would suggest that the capacity of the link is about 83 percent of the theoretical maximum of the modem: 1,440cps. Some of the remaining 17 percent is taken up with the information controlling the link, which may be different for providers such as AOL that don't use TCP/IP.

If you don't have files to use for tests, there are some specially-constructed ones available on the Demon internet ftp server, ftp.demon.co.uk (in the /pub/test directory). Remember that you will need to run any tests a few times and even then they'll only be approximate.

The mail must get through

Q. *"How could I set mail forwarding on my university (unix) email account? I want it set up so that all the email posted to my university account is sent to my demon account. Also, how can I generate a standard letter (like your* Net.answers *one), that is despatched automatically to people who have sent me email.? I want to be able to do it from my Demon account if possible."*

A. Setting up forwarding from one mail system to another is usually fairly easy to do but you'll need to find out what sort of email system the computer is running. For many Unix systems, the program that handles messages is called sendmail. On most SCO Unix machines, it's MMDF. If you can't find out from the login messages, ask the system administrator.

To forward mail on a computer that's running sendmail, all you need to do is to create a file called .forward in your home directory. The file contains the address to which you want messages sent. On an MMDF system you should create a file called .maildelivery and put a line like this in it:

```
*    -    pipe    ?    resend
my_other_address@somewhere
```

Whatever system you use, you should make sure that the files cannot be written to by anyone else, otherwise they could alter where your mail is sent and the mail programs will then ignore anything you put in there.

On an MMDF system you can also use the .maildelivery file to sort messages automatically, depending on authors and subjects: use the man command to check the manual page for "maildelivery" for more details.

Automatic replies are a little trickier. When you write to me at *Net.answers*, the response you receive is generated by a program called "rcvtrip" which is part of MMDF on my SCO Unix system. Computers running sendmail have a similar program called "vacation."

On personal computers, however, many of the free and shareware mail programs

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which are available don't provide facilities for automatic replies to messages so you'll have to investigate some of the alternative commercial packages. If you don't want to spend a lot of money finding out which packages will do the job, consider looking at the beta version of Eudora Pro 3.0 for Windows or Macintosh, which can be downloaded from the Qualcomm web pages at www.eudora.com/ and provides all the features you need, though since it's a POP mail program you'll also need a POP server to run on your computer.

What's in a name?

Q. "*I have been told that if I want a website with a concise URL (such as just a domain name) I have to pay extra for a "virtual server". What is a virtual server and do I really need one? Why should they cost more?*"

A. When you take web space on someone's server, you'll be given a directory in which you can put all your files and create more directories of your own.

The simplest way to advertise your website is by putting the name of the directory on the end of the URL. So, for example, our *PCW* website can be found at www.vnu.co.uk/hc/pcw/. For a commercial site, you might find that the URL you're given contains the name of the service provider. If you register your own domain, you could hide some of that: if *Personal Computer World* registered pcw.co.uk, we could arrange for www.pcw.co.uk to point to the same web server that we use at the moment, but the URL would still be long; www.pcw.co.uk/hc/pcw/. If you missed off the path at the end, you'd see our company's VNU Publications home page, instead of the *PCW* one, which could confuse a lot of users.

A virtual server is a way of allocating another name to a web server in such a way that you can refer merely to the name and the server will automatically know which directory to look at. In our example, it would mean that www.pcw.co.uk would show the correct *PCW* home page.

There are two reasons why this costs more than a standard type of URL. The first is capitalism and the second is that it's necessary to allocate a unique internet address for each virtual server and the computer running the web server must be configured to recognise all the different addresses it's been given. The web server software then uses the address that's been called, to decide what pages to display.

Allocating internet addresses is a fairly complex task and most providers have a limited number available to them at any time, so they will charge extra for the virtual server facility.

In future, this type of service may become cheaper as revisions to HTTP (the protocol your browser uses to request web pages from a server) will make it possible to have virtual servers without allocating a unique address to each. But before that can happen, everyone will need to be using updated web browsers, so don't hold your breath.

Secret messages

Q. "*We'd like to send email, to all the members of our society, with a single message but without revealing the email addresses to everyone. How can we do this on a Macintosh?*"

A. The simplest way to do this is to create an address book entry in your email program which contains all your members and to create a message with the address book entry in the Bcc: field.

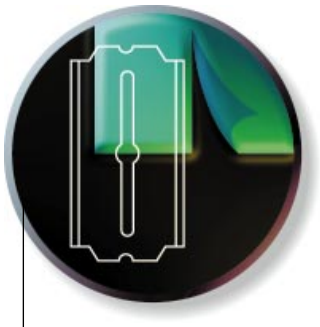
Remember that you'll also need to put an address in the To: field of the message, otherwise your internet provider's mail system will add Apparently-To: lines listing all the recipients. The best solution is to put your own address in the To: field.

Eudora Lite will allow you to create address lists, or you could consider using the Claris Emailer which has a rather easier-to-use address book. You can download the Lite version from the Claris web server.

PCW Contacts

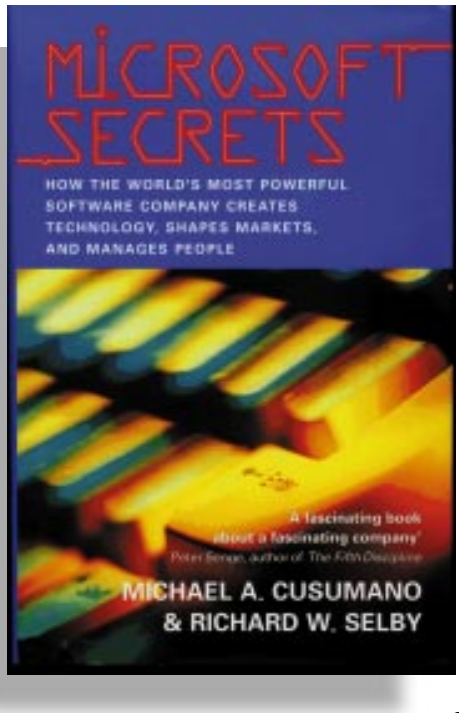
Nigel Whitfield is a freelance writer and maintainer of several internet mailing lists. He welcomes comments via the address **nigel@stonewall.demon.co.uk**

If you have questions you'd like answered, please send them to **net.answers@stonewall.demon.co.uk** Please note that a personal response to every query cannot be guaranteed.



Books

How Microsoft achieved the success it has today, cities of the future, and cyberculture.



Microsoft Secrets: How the World's Most Powerful Software Company Creates Technology, Shapes Markets, and Manages People

If you're one of the thousands of people who'd like to become the next Bill Gates (i.e. very rich and powerful) and have your very own kind of "Microsoft", then you may want some tips from the source itself. *Microsoft Secrets* is every anorak's dream on the "how to's" of why a company like Microsoft became so big, so fast.

The authors, Cusumano and Selby, have managed to bang out 512 pages on the reasons Microsoft has become what it is today. With unprecented access to company personnel, internal strategic memos, and the big man himself during 1993-94 with some follow-up information from 1995, these two academics have managed to put together an insightful guide to the inner workings of Microsoft.

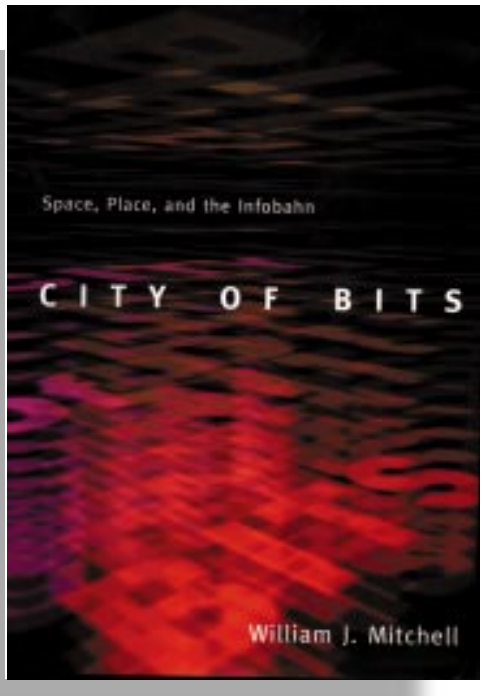
Secrets eschews the gossipy intra-office fare one has come to expect from other books and instead the book focuses on the processes by which Microsoft operates, both internally and externally.

Cusumano and Selby naturally cover the history of Microsoft, from its inception to the present day, but their main focus is on how Microsoft creates, develops and markets its product.

Strategies like "hire the smartest employees you can find" (that's always a good start) and a reminder to ensure that "new features are twice as good to justify being different" are only two examples of what's covered. Techies will no doubt like the chapters that discuss code sharing, daily builds and debugging, while those with more management bias will appreciate Microsoft's use of "milestones" and "ladder levels" to direct, retain and reward its people.

The only down side of the book is the somewhat sycophantic tone the authors take in some chapters toward all things Microsoft. The size of the book may also deter some from selecting it, but if you want an inside glimpse of how Microsoft manages its success, or if you want some tips for your own empire, it's worth checking out.

Dylan Armbrust



City of Bits: Space, Place and the Infobahn

Global village or urban bitsphere: are we moving towards the metamorphosis of our physical cities into virtual enclaves, inhabited by disembodied citizens?

In *City of Bits*, William J Mitchell draws startling comparisons between the cities we inhabit today, and those we are building for the future, that have no physical presence in the tactile world.

Using the city as a analogy, Mitchell takes us on a journey through our digital future. Drawing parallels with the urban landscape of today and the silicon landscape of the internet, he seeks to show us that the digital cities we are building

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Top Ten Books/CD-ROMs

1	Java in a Nutshell: Desktop Quick Reference	O'Reilly	£10.95
2	Visual Basic Programmer's Guide to the Win32 API	Ziff-Davis	£46.99
3	HTML: Definitive Guide	O'Reilly	£20.50
4	Core Java: SunSoft Java Series	Prentice-Hall	£32.95
5	MPC Internals	Addison-Wesley	£33.95
6	Internet and World Wide Web: The Rough Guide	Penguin	£5.00
7	Essential Client/Server Survival Guide	Wiley	£22.50
8	CGI Programming on the World Wide Web	O'Reilly	£26.00
9	Accidential Empires	Penguin	£7.99
10	Rapid Development: Training Wild Software Schedules	Microsoft Press	£32.49

List supplied by The PC BookShop, 11 & 21 Sicilian Avenue, London WC1A 2HQ
Tel: 0171 831 0022. Fax: 0171 831 0443

have much in common with their concrete predecessors.

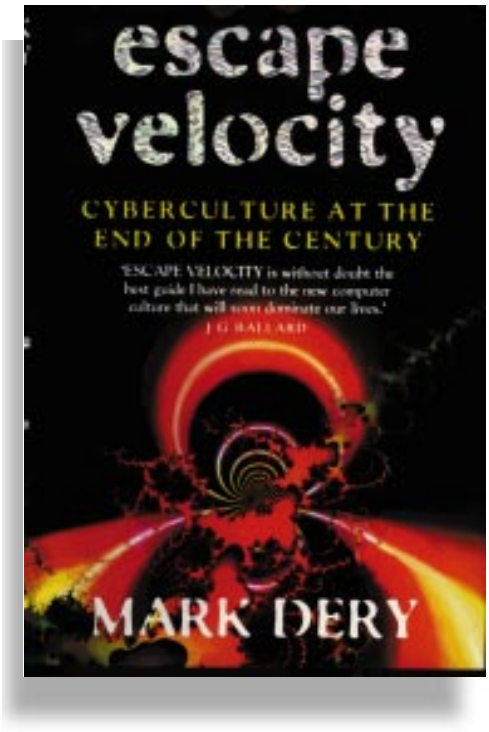
In today's cities, one of the key embedded symbols that buildings should reflect their use and power breaks down when transported to the net. Libraries and corporate headquarters, for instance, become shadows of their former selves.

On the web, your physical location is irrelevant. If you do have a physical address, it is just binary digits in a server somewhere. You may log in to your "space" from any geographically-remote location to fetch your mail or continue your work, but does this constitute a presence in the physical world? As Mitchell points out in the book: "The net is ambient — nowhere in particular but everywhere at once."

This transit to the digital city will move us to ask how the inhabitants themselves will react to its design. Does your web site become the new real estate? Mitchell writes: "How should communities define their boundaries, and how might they maintain their norms within those boundaries? What are the legitimate forms of power? How might political discourse be constructed?"

These, and many other questions, are posed in this book. The internet may be likened to a highway, but the communities that we build on that highway will look to the cities of today for a model. *City of Bits* provides food for thought as we embark on the construction of the new digital metropolis of the future.

Dave Howell



Escape Velocity: Cyberculture at the end of the Century

The millennia will signal the emergence of what until now has been a subculture. Technology continues to advance, evolving into startling new forms.

Over the next few years we will attain what Mark Dery calls escape velocity, which will propel us into a new existence. The elements of this technological convergence make up the body of the book.

Dery's search brought him into contact with musicians, cyborgs, performance artists and cyberpunks of every subspecies. His writing is a snapshot of the cyberculture that exists in the USA, and comes from an entirely American perspective. But as the net and many other elements of cyberculture transverse continents and national boundaries, so much of what Dery has found in the USA can easily be uncovered in any industrialised nation.

The characters in *Escape Velocity* are the men and women of the new frontier, who are shaping the world for the rest of us to colonise at a later date. The individuals that make up cyberculture are pushing until they achieve critical mass and transport themselves to the next plain of existence, which they share with the technology they have created.

This brave new post-industrial world utilises many metaphors associated with the transcendental ascension to a new spiritual plain. But in this context, this ascension will be confined within the datasphere. The virtual environments we construct may be our final attempt at the Utopia that has so far eluded us.

Dery is our guide to this future. His writing sparkles with the confidence of someone who is ready, willing and able to take up the mantle of the individuals he describes. Here you will read about techno-pagans, rogue technologists and the counter-culture that is emerging from its ghetto cocoon, to take its place in the society of the 21st century.

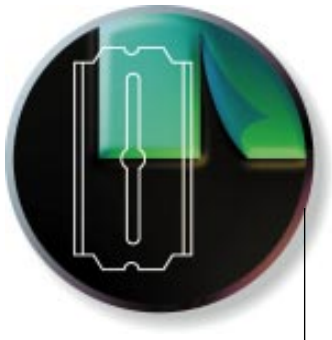
Dave Howell

PCW Contacts

Microsoft Secrets: How the World's Most Powerful Software Company Creates Technology, Shapes Markets, and Manages People
Authors Michael A Cusumano & Richard W Selby
Publisher Harper Collins
ISBN 0-00-255692-8
Price £20
Rating ★ ★ ★ 1/2

City of Bits: Space, Place and the Infobahn
Author William J Mitchell
Publisher MIT Press
ISBN 0-262-63176-8
Price £8.50
Rating ★ ★ ★ ★

Escape Velocity: Cyberculture At The End Of The Century
Author Mark Dery
Publisher Hodder & Stoughton
ISBN 0-340-67201-3
Price £6.99
Rating ★ ★ ★ ★



Brain drain

Toby Howard considers silicon implants with a difference: will we ever be uploading data from our brains and interacting with conscious computers? Meanwhile, **Tim Frost** takes time out to examine the options for copy-protecting software.

"Click here to upload your soul" was one of the tamer headlines seen recently in reports describing the "new research direction" of British Telecom's research labs at Martlesham Heath. As reported by such authorities as *The Guardian*, *Reuters*, *Time*, and the Electronic Telegraph, BT is embarking on a new research project.

Funded to the tune of £25m, an eight-man team is developing a "Soul-Catcher" memory chip. This chip will be implanted behind a person's eye and will record all the thoughts and experiences of their lifetime.

The idea that we might migrate minds from brains into silicon has been around for a while and is usually referred to as "uploading". This might be achieved destructively, by visiting each neuron in turn, determining its particular characteristics and interconnections and replacing it with an equivalent microscopic computer based on nanotechnology. Or, perhaps preferable from the patient's point of view, by non-destructively scanning the structure of the living brain and reproducing it elsewhere in silicon, rather like copying a complex drawing using a pantograph.

The amount of data involved would be immense since the hardware of our nervous system is believed to comprise around 10^{12} neurons with 10^{15} synaptic interconnections. Yet the capacity of silicon for storing information is increasing at an almost unbelievable rate. "Moore's Law", first expressed by Intel co-founder Gordon Moore in 1964, stated that the density of chips roughly doubles every year. Although the doubling period since the early seventies is now more like 18 months, we are still seeing an explosive growth of chip power. If the trend continues into the next century we might expect, by 2025, to store ten million megabytes (ten terabytes, or 10^{13} bytes) on a single chip. If so, we could record information about a brain's physical structure in a few of these chips.

But to talk about uploading thoughts and memories is quite another matter. When we talk about brains and minds, we must confront the classic "mind-body problem". We know that the brain is a collection of biological structures of unimaginable complexity (at least, so far). Outwardly this "brain-stuff" once described by computing pioneer Alan Turing as being like a bowl of cold porridge, is unmistakably physical. Deeper, a stained microscopic section of brain matter reveals a riot of interconnected neurons that looks like squashed rhubarb. How can this biology conjure or host the mystery of human consciousness? How can our minds influence the matter in the universe?

Imagine that you're in the pub, and you fancy a bottle of beer. Within moments, the bartender obliges. Your mind has somehow caused countless billions of atoms in the universe — atoms in your muscles, your throat, the air, the barman's ears, his brain, his muscles, the 'fridge, the bottle, the opener, the glass — to respond to your will. Quite a trick for porridge and rhubarb!

What is this "you" that has such power to disrupt the universe? Are "you" some ethereal entity, operating the controls of the brain machine? Or is the machine itself so complex that in our inability to understand its activity, we seek refuge in the idea of a separate "soul"? For the proponents of "Strong Artificial Intelligence", the answer is clear. Human consciousness really is nothing more than the algorithmic bubbling of cold porridge and in fact any sufficiently complex algorithm, running on any kind of machine, will lead inexorably to thinking and consciousness. Or so they say. A fierce debate rages over this claim.

If the Strong AI researchers are right, we should one day expect to see computers which behave as if they are conscious. It's the "as if" here which so antagonises the philosophers. But the possibility of creating conscious machines raises serious ethical questions. What rights would a conscious machine possess? Would concerned

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individuals form a Royal Society for the Protection of Cruelty to Machines? Would those of a religious bent demand that a conscious machine be taught how to worship God? What if conscious machines did not like us and turned nasty?

But we must, I regret, be sceptical futurists and return to earth. Is BT really trying to cache our consciousness onto chips stuffed in our heads? "No!", says Dr Chris Winter, the BT researcher quoted in the press as heading the "team of eight Soul-Catcher scientists". "We aren't building anything!" he told me. The whole story is media invention, developed like Chinese Whispers from its origins at an after-dinner press briefing Winter gave to local journalists, intending to enthuse them about the future-looking work at BT Labs.

Winter's research group had simply undertaken a "technology trend analysis" to speculate on the future capacity of silicon and, using Moore's Law, had estimated the ten terabyte chip by 2025. To illustrate the immensity of such storage Winter compared it with a back-of-an-envelope guestimate of the volume of data input through a person's sensory organs in an average 70-year lifespan, which is ten terabytes. The press took it from there.

Since current research into neuro-computational cochlear implants for the deaf and retinal implants for the blind is proving successful, perhaps in the distant future something like the Soul-Catcher will become a reality. However, the vision of Bob Hoskins saying "It's good to upload" makes me reach for another universe-changing beer.

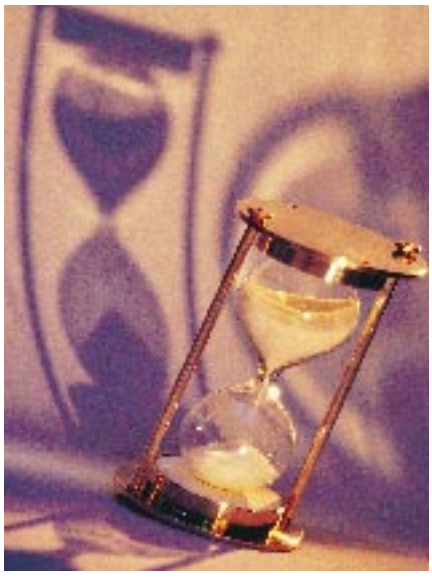
Toby Howard

The clock is ticking

Thoughts of software copy protection probably take you back to the days of key disks, dongles and wasting time looking up key-words in the manual. While few argue the case that software companies shouldn't protect themselves against piracy: the sheer inconvenience and uselessness of the systems on offer as the PC developed, made them a nightmare.

The situation continues in some areas. Only last month, I read a press release from a specialist software house announcing the removal of copy protection from its software simply because it had been causing problems, interfering with other completely innocent programs on users' PCs (although they didn't quite put it that way).

Despite their rather murky history, some protection systems seem to be thriving and for reasons that are quite separate from the job of actually preventing copying. For a start, the latest generations of systems (both software and hardware) are virtually transparent to the user. The software is protected yet apart from entering a password when loading the program to disk the user can be totally unaware that the software is protected — unless of course they try and use it illegally. The better ones don't interfere with the general operation of the computer anywhere near as badly, if at all. Software producers are still slightly unsure about copy protection *per se* but the new addition of limiting and metering access rather than putting in blanket copy is



beginning to turn their attention back to it.

We've all had programs, off magazines' free cover-mount discs, which offer a limited testing period. When the period is over, some just continue working, announcing at start-up that the period has ended. Others switch off altogether by using what would traditionally have been considered as copy protection software.

The ability to time-stamp software has more applications than merely trial software sampling. There are many software producers who supply time-sensitive data, like databases of legal regulations that are frequently updated to ensure that clients always have the latest version.

The traditional approach for these high-value databases is to send them out on a CD-ROM and at the end of the period get the user to return it so that it can be replaced with the latest version. The return/replace cycle is to make sure that there are no old versions left in the marketplace to be passed on to "friends" or mistakenly used for real.

Making this physical return system happen reliably is a real pain and takes a lot of organising but by time-stamping the software, the job is vastly simplified. The company sends out the updated copy each quarter, safe in the knowledge that the old one has expired and will be thrown away. (And anyone who thinks that changing the date on the PC's clock gets around that is living in the past. These systems use additional software controls to monitor the real time that the software has been used, regardless of the PC's clock setting).

A variation on this theme is keeping the software available on the disc but limiting the number of accesses. This can be used to meter the software or sell its occasional usage. Metering works just like an office franking machine: you put some money into it and use it on a pay-per-use basis until the money in the meter runs out. Then you refill it. The money goes to the software company, which then supplies a password. This includes the data that the meter needs to tell it how many more times to allow the software be used. This gives the software company a reasonable income and the user only pays only for the actual usage.

There is an alternative, which is to phone up and pay a fee each time the software is needed. This would be totally impractical for something like a word processor, yet for companies providing the sort of training software that normally goes on a video, the move to protected programming on CD can be a useful step forward.

Since these programs are only used every now and again, businesses usually rent out the video and training pack for a few weeks and then have to return them. With a CD-ROM version, things take on a different approach. Since the discs can't be used until they have been unlocked with a code supplied by the training company, they can be sent out once and left on the client's shelves until the training day arrives. A phone call releases their contents for a set period and the discs then go back to sleep until the next time they are needed.

Giving away discs that cost well under a pound to make, is a lot cheaper than continually shipping tapes backwards and forwards and the added bonus for the training organisation is that the CDs are sitting on the client's shelf, saying "Use me".

Tim Frost

Hands On Contents

■ Hands On is the place where readers can contribute to *PCW*, and as always we'll pay for anything we use. Macros, sections of code, and hints and tips will be rewarded with a £20 book or record token (please say which you'd prefer) and we'll pay hard cash for longer, more involved pieces. Please include relevant screenshots in .GIF format.
All submissions should be emailed to the author of the appropriate section or snailmailed to Hands On, Personal Computer World Editorial, VNU House, 32-34 Broadwick Street, London W1A 2HG. Questions and short hints and tips can be faxed on 0171 316 9313.
We're constantly working to improve the contents of Hands On. If you have any suggestions, send them to the Editor at the address above, or email them to: editor@pcw.ccmail.compuserve.com

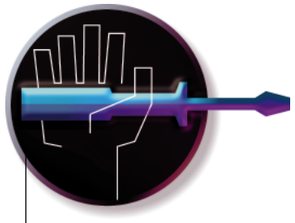
Workshop

Operating Systems

Applications

Programming

and the rest...



Group therapy

Having dealt with the basics, Mark Whitehorn delves deeper into SQL and shows you how to organise your records logically, in part II of our four-part tutorial.

Last month, we looked at the basic building-blocks of SQL and the ways in which they can be put together to elicit information from a database. With those commands alone you could pose an almost infinite series of queries, but SQL still has a whole range of tricks up its sleeve.

(*Last month's sample tables reappear in the screen shots here, so you won't have to fight with two magazines at once).*

Built-in Functions

SQL includes several simple statistical functions:

Function	
SUM	Total
COUNT	The number of occurrences
AVG	Average
MIN	Minimum
MAX	Maximum

Thus, it is possible (although not normal practice) to write SQL statements such as:

```
SELECT SUM(Amount)
FROM SALES;
```

Some systems will actually accept this. Access, for instance, generates a "dummy" field name (Expr1000) and yields the following table:

Expr1000
£5,117.57

It is common to explicitly name the field into which to place the output. For example:

```
SELECT SUM(Amount) "Sum of Amount"
FROM SALES;
```

or:

```
SELECT SUM(Amount) AS SumOfAmount
FROM SALES;
```

or even:

```
SELECT DISTINCTROW
SUM(SALES.Amount) AS SumOfAmount
FROM SALES;
```

which is how it appears in the Access dialect of SQL. All three of the above yield a table like this:

SumOfAmount
£5,117.57

The AS followed by a field name simply tells the SQL statement to put the data into a field of that name in the answer table.

It is permissible to mix two or more functions, for example:

```
SELECT SUM(Amount) AS SumOfAmount,
COUNT(Amount) AS CountOfAmount,
AVG(Amount) AS AvgOfAmount,
MIN(Amount) AS MinOfAmount,
MAX(Amount) AS MaxOfAmount
FROM SALES;
```

which yields the table shown in Fig 1.

It's also perfectly permissible to mix fields like this:

```
SELECT COUNT(Customer) AS
 CountOfCustomer,
AVG(Amount) AS AvgOfAmount
FROM SALES;
```

giving:

CountOfCustomer	AvgOfAmount
7	£731.08

These functions will even operate on fields which contain no data. If we amend the base table (for the sake of this example only) to be as shown in Fig 2, then the SQL statement above will give:

CountOfCustomer	AvgOfAmount
5	£282.76

The COUNT function finds only five values and AVG sums the values that it finds and then divides the result by six (i.e.the number of values in that particular field) rather than seven (the number of records).

However, these functions are designed to yield only a single figure each. Thus, SQL statements such as:

```
SELECT Customer,
AVG(SALES.Amount) AS AvgOfAmount
FROM SALES;
```

are illegal because SELECT Customer can (and in this case, would) have an output consisting of multiple records, while the second:

```
SELECT AVG(SALES.Amount) AS
AvgOfAmount
```

can only have an output of a single record.

Several SQL implementations provide more than the basic functions.

For example, Access also provides:

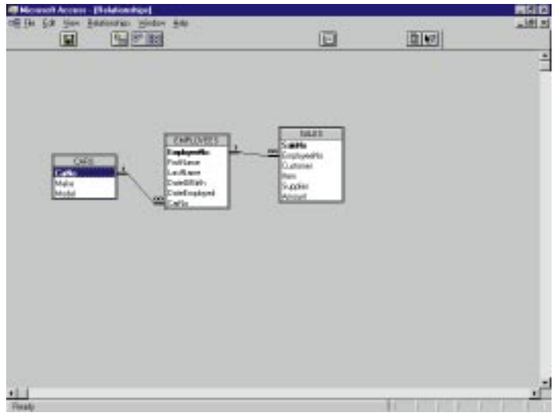
Function	
StDev	Standard Deviation
Var	Variance

Fig 1

SumOfAmount	CountOfAmount	AvgOfAmount	MinOfAmount	MaxOfAmount
£5,117.57	7	£731.08	£82.78	£3,421.00

Fig 2

SaleNo	EmployeeNo	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harrison	£235.67
2	1	Johnson	Chair	Harrison	£453.78
3	2		Stool	Ford	£82.78
4	2	Jones	Suite	Harrison	
5	3	Smith	Sofa	Harrison	£235.67
6	1		Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453.00



The relationship editor, showing the joins between the tables

It is just this kind of variation from the standard which demonstrates that SQL is still a fairly fluid standard.

GROUP BY — collecting information

So far, our generic SELECT statement looks like this:

```
SELECT field name(s)
FROM table name
WHERE condition(s)
ORDER BY field name(s)
```

We can expand it with:

```
SELECT field name(s)
FROM table name
WHERE condition(s)
GROUP BY Field name(s)
ORDER BY field name(s)
```

Last month we looked at the command ORDER BY, which provides a way of presenting information in ascending or descending order. Further control over your answer data is given by GROUP BY. The syntax is:

```
GROUP BY Field name(s)
```

To illustrate its usefulness, we'll consider the simple statement below:

```
SELECT AVG(Amount) AS AvgOfAmount
FROM SALES;
```

AvgOfAmount
£731.08

This averages the values found in the [Amount] field for all records in the SALES table. Suppose you want to examine the records which refer to customer "Simpson"? You'd use WHERE, as follows:-

```
SELECT AVG(Amount) AS AvgOfAmount
FROM SALES
WHERE Customer = "Simpson";
```

AvgOfAmount
£235.67

Now, suppose you want to do this for each customer. An inelegant, brute-force solution would be to run the query multiple times, once each for each customer. A clever solution is to get the SQL statement to group the records together by the name of the customer and then apply the AVG function to the values in the groups.

We can visualise the process as follows: going from the data shown in Fig 3, to that shown in Fig 4; and then to this, which is a full but compact summary of the required information:

Customer	AvgOfAmount
Johnson	£453.78
Jones	£1,937.00
Simpson	£235.67
Smith	£159.23

The SQL statement required to perform this magic is impressive:

```
SELECT Customer, AVG(Amount) AS
AvgOfAmount
FROM SALES
GROUP BY Customer
Order BY Customer;
```

The GROUP BY clause can be used more simply than this. For example:

```
SELECT Customer
FROM SALES
GROUP BY Customer;
```

produces:

Customer
Johnson
Jones
Simpson
Smith

At first, it appears that this is the same as:

```
SELECT DISTINCT Customer
FROM SALES;
```

which yields the same answer table, but adding another field demonstrates the difference. Thus:

```
SELECT DISTINCT Customer, Amount
FROM SALES;
```

produces:

Customer	Amount
Johnson	£453.78
Jones	£453.00
Jones	£3,421.00
Simpson	£235.67
Smith	£82.78
Smith	£235.67

whereas:

```
SELECT Customer, Amount
FROM SALES
GROUP BY Customer;
```

fails to run. Why? To answer this, we must look at what the SQL clauses are trying to achieve. The command:

```
SELECT Customer
FROM SALES
GROUP BY Customer;
```

essentially says "Sort the records in the SALES table so that identical values in the Customer field are together. Then 'crush together' the records with identical Customer values so that they appear to be one record." Thus:

```
SELECT Customer, Amount
FROM SALES
GROUP BY Customer;
```

Fig 3

SaleNo	EmployeeNo	Customer	Item	Supplier	Amount
1	1	Simpson	Sofa	Harrison	£235.67
2	1	Johnson	Chair	Harrison	£453.78
3	2	Smith	Stool	Ford	£82.78
4	2	Jones	Suite	Harrison	£3,421.00
5	3	Smith	Sofa	Harrison	£235.67
6	1	Simpson	Sofa	Harrison	£235.67
7	1	Jones	Bed	Ford	£453.00

Fig 4

SaleNo	EmployeeNo	Customer	Item	Supplier	Amount
2	1	Johnson	Chair	Harrison	£453.78
7	1	Jones	Bed	Ford	£453.00
4	2	Jones	Suite	Harrison	£3,421.00
6	1	Simpson	Sofa	Harrison	£235.67
1	1	Simpson	Sofa	Harrison	£235.67
5	3	Smith	Sofa	Harrison	£235.67
3	2	Smith	Stool	Ford	£82.78

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fails because there's a conflict (real in this case, potential in others) between the number of records that should be output.

```
SELECT Customer
FROM SALES
GROUP BY Customer;
```

will output four records:

Customer
Johnson
Jones
Simpson
Smith

while:

```
SELECT  Amount
FROM SALES;
```

will output seven records:

Amount
£235.67
£453.78
£82.78
£3,421.00
£235.67
£235.67
£453.00

Combining these two incompatible requests is impossible and SQL engines will refuse the statement. As you can see from the above, there is no obligation to combine GROUP BY with one or more of the functions. However, it is commonly done because we often only want to group records in order to be able to perform some type of manipulation on selections of records. It is perfectly possible to GROUP BY more than one field.

Thus:

```
SELECT Customer, Supplier,
 AVG(Amount) AS AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier;
```

produces more groups than the SQL statement above that grouped by one field, because it is grouping those records which share the same value in Customer and Supplier. The answer table is this:

Customer	Supplier	AvgOfAmount
Johnson	Harrison	£453.78
Jones	Ford	£453.00
Jones	Harrison	£3,421.00
Simpson	Harrison	£235.67
Smith	Ford	£82.78
Smith	Harrison	£235.67

which raises another interesting question: how can you tell how many records are actually contributing to each group? One answer (but by no means the only one) is:

```
SELECT Count(*) AS NumberInGroup,
Customer, Supplier, AVG(Amount) AS
AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier;
```

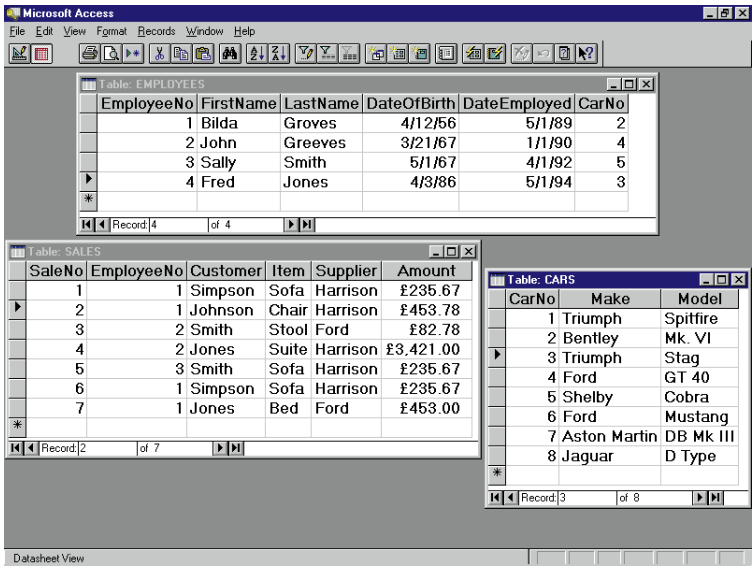
The only addition is the "Count(*) AS NumberInGroup" bit which simply says that the number of records in each group should be counted (Fig 5).

We could equally well use:

```
SELECT Count(Customer) AS
NumberInGroup, Customer, Supplier,
AVG(Amount)
AS AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier;
```

which returns the same answer table.

GROUP BY is an incredibly powerful tool



The tables used in my examples

and it can be made even more so with the addition of HAVING.

GROUP BY and HAVING — Collecting information together

Whereas the GROUP BY clause puts records into logical groupings, the HAVING clause allows you to select the groups that you want to see based on values which appertain to that group. Consider the example given above.

```
SELECT Customer, Supplier,
AVG(Amount) AS AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier;
```

Customer	Supplier	AvgOfAmount
Johnson	Harrison	£453.78
Jones	Ford	£453.00
Jones	Harrison	£3,421.00
Simpson	Harrison	£235.67
Smith	Ford	£82.78
Smith	Harrison	£235.67

Suppose, now the records are grouped in this way, that we are only interested in the groups where the average amount is £250 or more? The foolish solution is:

```
SELECT Customer, Supplier,
AVG(Amount) AS AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier
ORDER BY AVG(Amount);
```

Customer	Supplier	AvgOfAmount
Smith	Ford	£82.78
Smith	Harrison	£235.67
Simpson	Harrison	£235.67
Jones	Ford	£453.00
Johnson	Harrison	£453.78
Jones	Harrison	£3,421.00

which, although it renders the desired values easy to find, nevertheless still leaves the job of actually locating them, up to the user. A much better solution would be:

```
SELECT Customer, Supplier,
AVG(Amount) AS AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier
HAVING AVG(Amount) >= 250;
```

Customer	Supplier	AvgOfAmount
Johnson	Harrison	£453.78
Jones	Ford	£453.00
Jones	Harrison	£3,421.00

You can, of course, still order the groups:

```
SELECT Customer, Supplier,
AVG(Amount) AS AvgOfAmount
FROM SALES
GROUP BY Customer, Supplier
HAVING AVG(Amount) >= 250
ORDER BY AVG(Amount);
```

Customer	Supplier	AvgOfAmount
Jones	Ford	£453.00
Johnson	Harrison	£453.78
Jones	Harrison	£3,421.00

Working with multiple tables

So far, we have looked at using the SELECT statement with a single table. Clearly, since the relational model encourages us to split complex data into separate tables we will often find it necessary to recover data from two or more tables. To do this, we have to use the SELECT statement to draw data from both and the WHERE clause to form the joins.

Before we do, let's try querying the tables without using the WHERE clause.

```
SELECT SALES.Customer,
EMPLOYEES.LastName, SALES.Amount
FROM SALES, EMPLOYEES;
```

produces the data shown in Fig6.

Note that this SQL statement includes, for the first time, the table names when fields are being specified. Up to this point our SELECT statements have referred to single tables. Since field names within a single table must be unique, the field name alone allowed us to unambiguously identify the fields. However, field names can (and often are) shared by different tables. For example, both SALES and EMPLOYEES have a field called EmployeeNo. Therefore, the only way to identify a precise field uniquely is to use the table name as well. SQL syntax typically has the table name first in upper case, followed by a dot, followed by the field name in lower case.

SQL allows you to substitute temporary synonyms for table names:

```
SELECT S.Customer, E.LastName,
S.Amount
FROM SALES S, EMPLOYEES E;
```

which can shorten statements considerably but also tends to makes them less readable.

Note that the synonyms are defined in the FROM clause, but can still be used in the SELECT clause which tells you something about the way in which the SQL statement is read by the RDBMS.

To return to the multiple table query, if we were to add a WHERE clause as shown here:

```
SELECT SALES.Customer,
EMPLOYEES.LastName, SALES.Amount
FROM SALES, EMPLOYEES
WHERE SALES.EmployeeNo =
EMPLOYEES.EmployeeNo;
```

we get:

Customer	LastName	Amount
Simpson	Groves	£235.67
Johnson	Groves	£453.78
Simpson	Groves	£235.67
Jones	Groves	£453.00
Smith	Greeves	£82.78
Jones	Greeves	£3,421.00
Smith	Smith	£235.67

Referring to the base tables shows that this is a more useful answer table than the previous one.

How it works, and what it's doing, will be revealed next month. ■

Fig 6

Customer	LastName	Amount
Simpson	Groves	£235.67
Johnson	Groves	£453.78
Smith	Groves	£82.78
Jones	Groves	£3,421.00
Smith	Groves	£235.67
Simpson	Groves	£235.67
Jones	Groves	£453.00
Simpson	Greeves	£235.67
Johnson	Greeves	£453.78
Smith	Greeves	£82.78
Jones	Greeves	£3,421.00
Smith	Greeves	£235.67
Simpson	Greeves	£235.67
Jones	Greeves	£453.00
Simpson	Smith	£235.67
Johnson	Smith	£453.78
Smith	Smith	£82.78
Jones	Smith	£3,421.00
Smith	Smith	£235.67
Simpson	Smith	£235.67
Jones	Smith	£453.00
Simpson	Jones	£235.67
Johnson	Jones	£453.78
Smith	Jones	£82.78
Jones	Jones	£3,421.00
Smith	Jones	£235.67
Simpson	Jones	£235.67
Jones	Jones	£453.00

Fig 5

NumberInGroup	Customer	Supplier	AvgOfAmount
1	Johnson	Harrison	£453.78
1	Jones	Ford	£453.00
1	Jones	Harrison	£3,421.00
2	Simpson	Harrison	£235.67
1	Smith	Ford	£82.78
1	Smith	Harrison	£235.67

Where you **bin?**

Hanging around the Recycle Bin, probably, wondering what on earth it's for. Tim Nott takes the lid off this enticing little mystery. He takes some Notes as well, and gets FAT.

Many people seem confused about that fine bit of desktop furniture called the Recycle Bin. The following dialogue should help. For added effect, read it in a variety of silly voices.

Q. What is the Bin and how does it work?

A. It's a holding area for deleted files. When you send a file to the Bin, it stays there until you empty the Bin or…

Q. So my hard disk is filling up with stuff I don't want?

A. If I can finish... or the Bin is full, when items get permanently flushed on a first-in first-out basis. You can control the size of the Bin as a percentage of disk space, either globally or on a per-drive basis, from the Recycle Bin properties dialogue.

Q. Can I empty just some of the contents?

A. Certainly — open the Bin, select the files you want removed and delete them. The quickest way of clearing the entire contents is to right-click and "Empty" on the Bin icon.

Q. As in real life, I keep missing the Bin. I end up copying, moving or creating shortcuts on the Desktop instead of dropping the files cleanly in the Bin.

A. Just because you can drag items on to the Bin icon, it doesn't mean you have to. It's much easier to right-click on the file(s) and pick "Delete" or select them and press "Delete" on the keyboard. If you really want to drag and drop, open the Bin first to give yourself a bigger target.

Q. Why did Microsoft put the Bin on the Desktop? And how can I get rid of it? Or even rename it to something less twee?

A. Good question. It can be hidden with the System Policy Editor (see September's column) or TweakUI (see October's column). If you don't have either of these, and feel brave enough, then back up the Registry and run Regedit. Go to:

```
HKEY_LOCAL_MACHINE\SOFTWARE\
Microsoft\Windows\CurrentVersion\
explorer\Desktop\NameSpace
```

Depending on your setup, you'll see several keys below this, one of which is

```
{645FF040-5081-101B-9F08
00AA002F954E}
```

Deleting this key will remove the Recycle Bin icon from your Desktop. The problem with these methods is that you have to dig into Explorer to access it, and it will (misleadingly) report that it "belongs" to the current drive or partition, if you have more than one. If you want to rename it, back up the Registry, run Regedit and go to:

```
HKEY_CLASSES_ROOT\CLSID\{645FF040
5081-101B-9F08-00AA002F954E}
```

Double click on "default" in the right-hand pane and change the name in the dialogue box that appears.

Q. I have several Recycle Bins — one on each disk partition and one on the Desktop. Can I delete the redundant ones? If so, which?

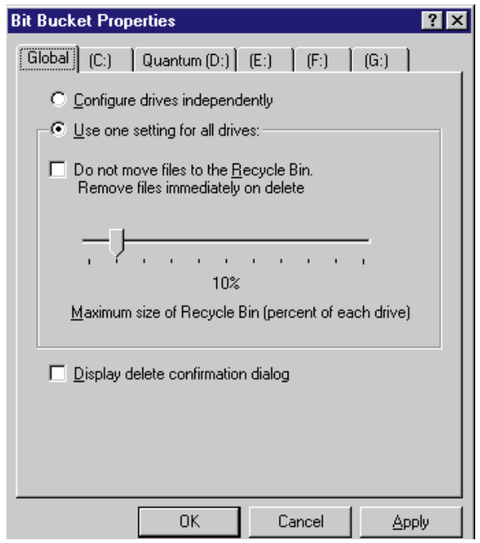
A. The Desktop Bin is a "special" folder that shows everything in the Bin. The actual files themselves are stored on a per-drive basis in folders named "Recycled". These all appear to have the same contents from Explorer, but if you use File Manager you can see what is really going on: as well as the deleted files (which have cryptic names), an "Info" file records the original name and path for each file. So leave them all alone.

Q. How do I retrieve something from the Bin?

A. If you've just deleted it, right-click in any folder, or the Desktop, and choose "Undo delete". Open the Bin, right-click on the wanted file and select "Restore" to put it back where it was. You can drag files out of the Bin to any open folder, or the Desktop.

Q. I don't make mistakes. If I want to delete something, I want it really deleted and I want it to stay deleted. How?

A. Four ways. If you Shift + Delete a file, it bypasses the Bin and goes straight to oblivion. Alternatively, right click on the Bin, select "Properties" and check the "Do not move files to the Recycle Bin. Remove files immediately on delete" box, which makes this the default. Using DOS or File Manager to delete files also bypasses the Bin.



The (renamed) Recycle Bin properties. You can limit the size overall or on a per-drive basis

Vulcan's main window, with a sample note inset

Q. As I said, I know what I'm doing, and get very annoyed when Windows asks me for confirmation on delete. How do I stop this?

A. You can turn off "Display delete confirmation dialogue" from Properties, but this only applies to sending items to the Bin. If you bypass the Bin, as above, or empty some or all of its contents, you're stuck with the confirmation dialogue. There's one rather curious exception to this. A single .EXE or .COM file is deleted without further ado.

Q. Er, how do I undelete something that has been bypassed or deleted from the Bin?

A. You close down Windows and restart in single MSDOS mode. You use the Lock, Undelete, and Unlock commands. You run a risk of losing Long File Names, but this is the least of your worries, as you also run a risk of shutting yourself out of Windows and screwing up your system drastically. But then, as you said, you don't make mistakes. For further reading see Clive Akass' column on page 34 of *PCW* March 1996. And in a dictionary, check "hubris" and "nemesis".

Nota bene

One thing I find myself doing a lot is making notes. Bits and pieces from email and the internet; details of commissions and deadlines, ideas, reminders, shopping lists — you name it, I scribble it. In the puppy-love stage of my relationship with Windows 95, I took a shine to the way you could create a new text file on the Desktop from the right mouse-button menu. This infatuation did not last. It takes three clicks to create the file, two to be able to rename it and two more clicks to open it. By which time, I've forgotten what it was I was going to type or paste in.

Moving on, I then found it much simpler, although less exciting, to have a shortcut to Notepad on the Desktop, with the properties set to "Start in…" my C:\WINDOWS\DESKTOP folder. A double-click to create, and a "File/Save As…" to name it, with the destination already set to the Desktop. This worked fine for a while, until I found I either had to excavate below various windows to find the various Notepad icons, or confine my word processing and other activities to the right-hand three inches of the screen.

Plan C saw a radical departure. I created a new folder on the Desktop called, with unashamed explicitness, "Notes". Doubtless I shall hear from Lotus' solicitors, but I like to live dangerously. I could have created the folder elsewhere and put a shortcut with the icon of my choice on the Desktop, but I decided to save that little treat for another day. I then redirected the Notepad shortcut "Start In" to here, set the Notes folder view to "List" and moved all the Notepad files into it. With this stroke, I reached the long-sought objective of just one row of icons on the Desktop.

There are, of course, better ways to manage this. Over the years, several electronic versions of sticky yellow (I'm not allowed to use the P-word for legal reasons) notes have appeared. And I think I've tried most of them. Winpost was my favourite for years, but its author, Higgy Higashyma, took a job with Microsoft and ceased developing it further. In April, I mentioned another product, which had two rather crippling limitations. You can only have one note, and its unauthorised use of the P-word means I'm not allowed to mention it.

So, I've been looking at two newish shareware note products. In the red corner, weighing in at 291Kb, from Colorado, USA, comes Vulcan Notes 95 (Vn95.zip on our CD-ROM). In the blue corner, all the way from Chester, England, comes the latest version of John Rennie's Notez, a wiry 151Kb under the name of Ntz324.zip.

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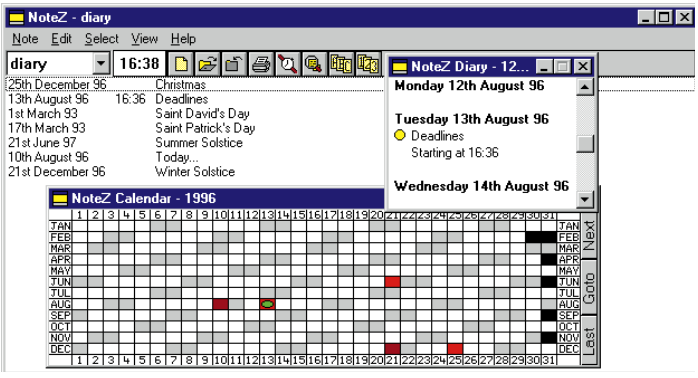

Notez main window with the calendar and diary inset

Vulcan is simple enough to use. The "master" window contains a list of your notes. You can have up to 100 and each one takes its title from the first non-blank line in the note. Above the list are buttons for creating new notes, opening an existing text or RTF file into a new note (the original is left), saving, printing, deleting, and showing or hiding all notes. You can also do all these things, and more, by right-clicking on any open note. The whole thing consists of just one executable, and each note is saved as a separate file. You can "alarm" notes to serve as reminders, and they are automatically saved when you quit.

The USP (unique selling point) is that notes can be formatted much as a word-processed document, with alignment, font, colour, bullets and so on. The file format is a subset of Rich Text Format (RTF), but unlike the latter doesn't support things such as graphics or multiple columns, so perhaps we should call it Comfortably-off Text Format. There's a facility to search (and replace) text in all notes. The note with the searched string is brought "on-top" with the string highlighted. Unfortunately, this doesn't work on minimised or closed notes.

Like Vulcan, NoteZ, apart from its data and help files, consists of one .EXE, but it does add its .INI file to your Windows folder. It starts to get complex, as when you first start the program, three windows appear. A calendar, diary and a list of notes. This, and the lack of status bar or pop-up hints, sent me scrambling for the Help file, but I soon had everything under control.

NoteZ's USP is the way notes can be organised into folders — the samples include a rather mouth-watering collection of Italian recipes — and with its calendar, diary and extensive alarm features, NoteZ has more leanings to a personal organiser. Like Vulcan, it stores notes in RTF, and will open and save RTF files. Although the formatting facilities aren't quite as extensive, you can mix fonts in a note. There's a search (but no replace) feature where notes containing the search string are highlighted in the list. You can open them all at once, but the strings themselves aren't highlighted.

NoteZ sticks an icon in the system tray: double-clicking creates a new note, and a right-click offers further options. Another touch I liked very much is the way you can drag and drop text between notes and other applications, which is something you can't do in Vulcan. Dislikes? There are no "Tooltips" on the buttons and there's no quick way of hiding all notes.

So there you have it. On the one hand elegant simplicity, on the other, feature-packed complexity. It's a question of personality, I reckon, as to which you prefer. Try the picnic test. Do you take along a bulky Swiss Army knife to cover all eventualities? Or do you prefer the bare necessities of a sharp blade and a corkscrew in a slim, sculpted handle?

Chewing the FAT

This autumn will see the release of FAT32 as part of OEM versions of Windows 95 — that is, installations that are pre-installed on new PCs. So what is it, and how does it affect us? The original FAT (File Allocation Table) dates from 1977 and was originally designed for storing data on floppy disks. Since then it has been fattened up to include hard disks, but it has several limitations which FAT32 seeks to overcome.

Two problems with the existing FAT concern large hard disks. First, FAT will only support disks up to 2Gb — a gigabyte being either 1000 or 1024Mb, depending on whether you're buying or selling. Secondly, FAT stores small files very inefficiently: each one takes up a "cluster", which is the smallest unit the FAT can allocate. The larger the disk, the larger the cluster size. A 250Mb disk uses 4096 bytes per cluster, and a gigabyte-plus disk uses 32768 bytes. Which means an 800-byte shortcut is rattling around like a pea in a cabin trunk. The partial solution to this problem is to partition the disk into smaller, "logical" drives, or use disk compression software that packs everything into one big file. Or, depending on your point of view, one big disaster-waiting-to-happen.

FAT32 supports partitions up to two terabytes. Yes, I had to look it up as well, but a terabyte is a mega-megabytes, which will probably be just enough for Windows and Office 2005. Cluster size is down, with a sub-8Gb partition using 4096-byte clusters. Other good news is that it is more robust, working from a backup copy of the table, and there is no limit on the number of entries in the root directory. It also allows dynamic resizing of partitions without data loss, but this won't be available in this release. (To go off at a slight tangent, there is a commercial utility called Partition Magic which does just this with a normal FAT.) The bad news is that you won't be able to dual-boot. Only Windows 95 supports FAT32, not Windows 3.1 or previous DOS versions.

Windows NT users have had these advantages for some time, with NTFS, which allows compression and password-protection on a per-file basis. So why didn't Microsoft offer this as the way forward for 95 users? The official answer is that it "Would have precluded the use of many MS-DOS mode games and applications."

This seems a patronising message. The platform for business users is NT Workstation, at about £250 a seat. Windows 95, at about £60, is just for game players and home users. The fact that it's the SoHo and family users who need built-in security to stop children or colleagues messing with their files, remains to be addressed.

At the double, left click

Let's have a happy ending this month, with a great little tip from Richard Ansdell of Coventry. In Explorer or any other window with column headings, move the cursor to a join in the column headings so that the cursor changes into a two-headed arrow. Instead of dragging, if you double left-click, the column expands or contracts to fit the widest entry.

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Weird and **Windowful**

Tim Nott turns agony uncle to tackle a strange DOS problem, smartdrive and vanishing Windows worries. There are ten top tricks to teach an an old dog, plus two treats on our CD.

Norman Burnell wrote from Cheshire with one of the weirdest problems I've heard for a long time. Something had gone wrong with a DOS game (so, nothing new there) on a friend's PC. Using Dosshell revealed a path which went:

```
C:\games\games\games\games\games\
games\…
```

and so on, until Dosshell ran out of memory some 6,000 directories later. Moving to Windows File Manager, it got stranger still: the contents of C:\games\ were a replica of the contents of C:\ as were the contents of C:\games\games\, C:games\games\games\ and so on. Another directory (C:\mp2\) behaved in the same bizarre, recursive, fashion.

Norman tried deleting some of the surplus directories. "*Too late I realised that ample disk space indicated the number of files was not a problem and it was the directory structure that was haywire. I had already cautiously (or so I thought) tried deleting one of the sub games directories, only to find that these apparent duplications were the real thing, hence DOS and Windows were among those that were no more.*"

The vital clue that he'd missed wasn't what was going *wrong*, but what was going *right*. If Windows was still loading, then the damage couldn't have been too severe. I searched the Microsoft Knowledge base for similar reports but unsuccessfully. I can only guess that there was an error in the disk directory structure which was responsible for the problem. Scandisk (or Chkdsk in earlier versions of MS-DOS) should be able to fix this automatically. It's certainly worth a try before deleting the lot and reinstalling. As to how it happened, I have no idea, but as ever in the mysterious happenings stakes, checking with an up-to-date virus detector is always a good idea.

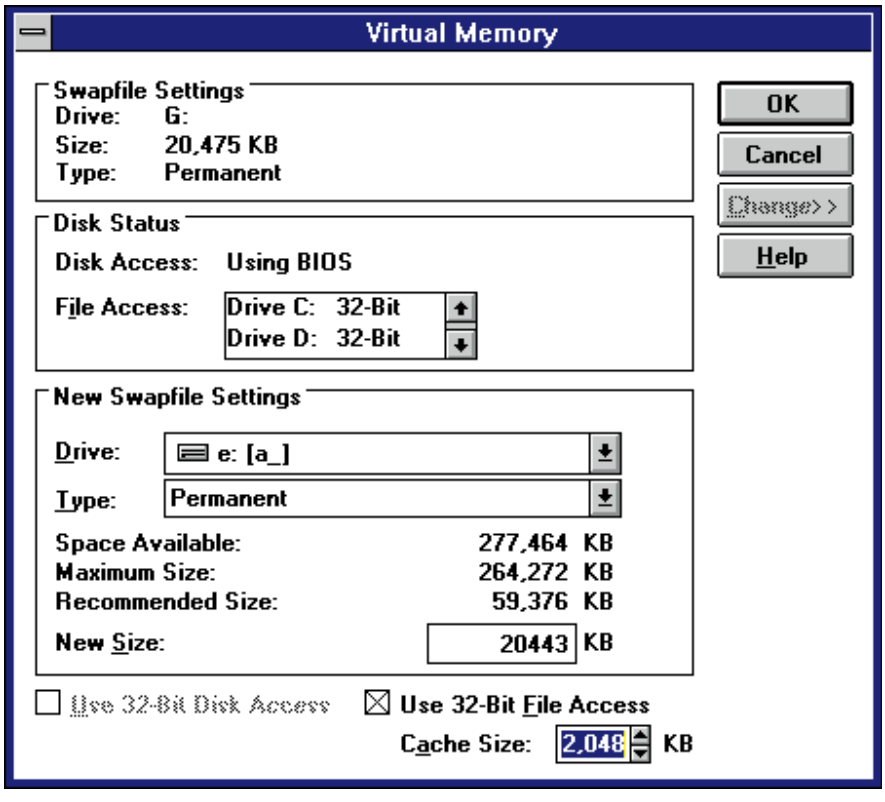


Fig 1 **You need to set up Windows 3.11 32-bit file access from Control Panel. It isn't automatic**

Get smart…

Roger Caton, of Bradford, writes: "*I have Windows for Workgroups 3.11 installed, I've enabled 32-bit file access and I'm told that I no longer need Smartdrive. However, the line C:\WINDOWS\SMARTDRV.EXE 2048 128 still appears in my AUTOEXEC.BAT file. Has Windows fouled up?*"

Roger is right, but so is Windows. To explain briefly, Smartdrive is a disk cache. That is, an area of memory that acts as a holding area for disk data. If it thinks the same data is likely to be read again, it stores it. Memory access is much faster than disk access, so performance is enhanced. Similarly, disk writes are held in the cache until it is "flushed" and all outstanding data written to disk. With Windows 3.11 came 32-bit file access and VCACHE (Fig 1), which replaces (and outperforms) Smartdrive when Windows is running.

The line in Roger's AUTOEXEC.BAT contains two numbers. The first is the size (in kilobytes) of the cache under DOS. If you

p254 ➢

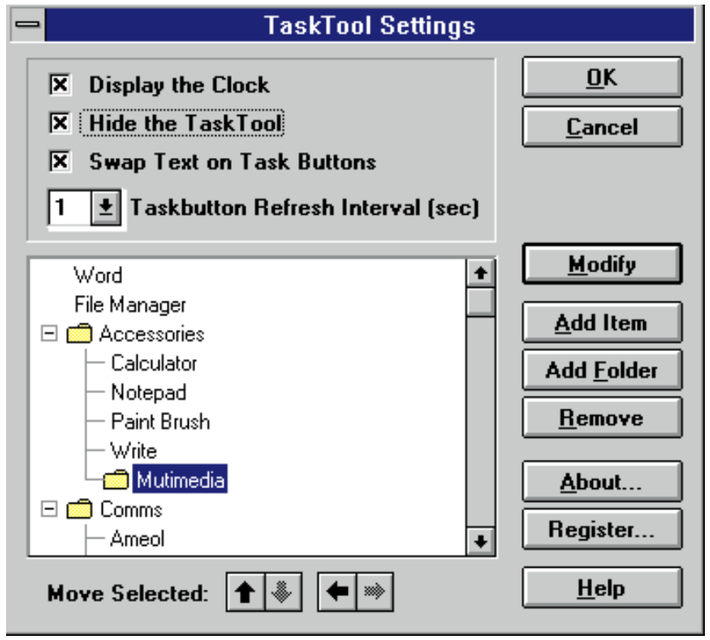
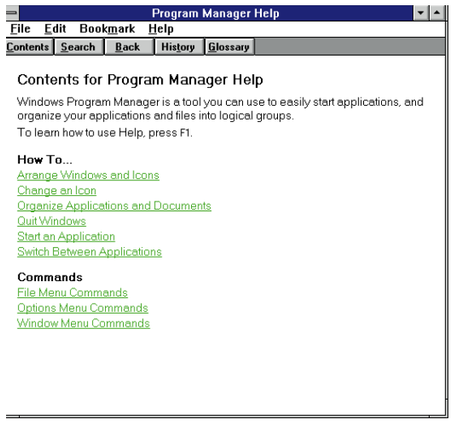
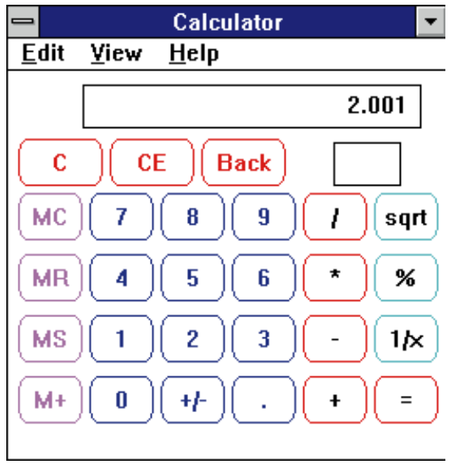


Fig 2 (above) Setting up TaskTool's cascading start menus — just like Windows 95
Fig 3 (right) Default values for positioning the Help screen are defined in the Win.ini file
Fig 4 (below, right) Various bugs on the Windows 3.x calculator have been fixed. Check out our cover CD for the new version





use any DOS applications, especially disk-intensive items such as databases, you still need this. The second figure shows the size of the cache under Windows, in this case a modest 128Kb. So why have it at all? The answer is that VCACHE doesn't work on floppy drives or CD-ROMs, so you'll find that even with this small cache, floppy access is much improved. Note that in order to cache CD-ROMs, the MSCDEX.EXE entry should appear before the SMARTDRV.EXE entry.

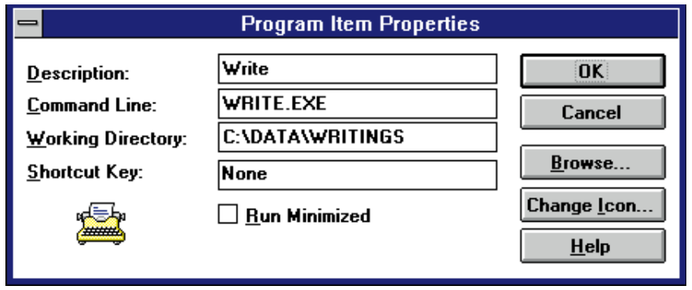
Where are they now? part II

Further to last month's "DIY" session on how to find missing bits of Windows,

Ten Program Manager tips

Despite the alternatives, the old dog can still get up to a few tricks. Here is my top ten, collected from various *Hands On Windows* columns over the last three years.

1. You can change the starting directory of programs. For example if you store Write documents in C:\data\writings, select the Write icon, go to File/Properties… (or press Alt+Enter) and enter this path in the Working Directory box. When you Open or Save As… you'll be in the target directory without having to traipse up and down the tree.
2. Further to the above tip, you can have multiple entries for the same program pointing to different working directories.
3. Icons use Resources — don't try to install more than 40 items per group and keep as few groups open as possible.
4. A related problem is that in 16-bit or 24-bit colour the limit decreases drastically. You'll get "out of memory" errors and solid black squares instead of icons.
5. For keyboard fans, Control + Tab switches between groups, Enter restores a minimised group or launches an item and the arrow keys move between items.
6. You don't have to use the icon that comes with the program. Hit the Change Icon button in File Properties and browse through .EXE and .DLL files. There's a good range of spares in Progman.exe and some tailor-made for DOS programs in Moricons.dll.
7. You can drag files from File Manager and drop them into Program Manager to create icons for programs or associated files.
8. If you've tidied up Program Manager and want to keep it that way, press Alt + Shift + F4 to save the current settings. Turn off "Options/Save settings on exit" to stop this being overwritten when you close down.
9. You can change the horizontal spacing between icons from Control Panel/Desktop, but to change the vertical spacing you need to add IconVerticalSpacing=nn to the [Desktop] section of WIN.INI, where nn is the number of pixels. Setting this to 50 gives room for just one line of text…
10. …so from File/Properties…, edit the Description of long-winded programs such as *The Universal Widget for Windows version 3.3* to something more succinct.



You can start a program in any directory you choose and change the icon

another component prone to doing a vanishing act is Windows Help (Fig 3) and this is usually because it has been moved off-screen.

The quick and ruthless approach is to open WIN.INI and delete the [Windows Help] section entirely. It will be rebuilt with sensible default values next time you start up Windows. However, if you really want to show off, the entry M_WindowPosition, followed by five figures gives the distance in pixels from screen left to window left, screen top to window top, width, height and a final 0 or 1 to signify windowed or maximised. The copy, history and annotation windows have similar entries, starting with C, H and A.

A dodgy takeaway

As has been reported to this column, the Windows 3.x calculator is broken for all values of x. One, purely cosmetic, bug is that zeroes to the right of the decimal point don't appear in real time. Try entering 5.0005 and you'll see what I mean. Nothing appears after 5.0 until the final digit has been typed. A rather more serious problem is that it doesn't subtract very well: for example, try 2.01 minus 2.

The good news is that (after four years) it has been fixed (Fig 4) although I don't believe the fixed version ever made it to the Windows installation disks. Anyway, you can find it on our cover-mounted CD-ROM, this month. Newcalc.exe is a self-extracting file containing the fixed calc.exe a swell as a readme file.

Called to the bar

From something old to something new. Well, new to Windows 3.x users anyway. Another utility on our CD-ROM this month is TaskTool (Fig 2). Copy Ttool21.exe to a temporary directory and run it to install. It consists of a bar that sits at the bottom of the screen, containing buttons for each application running, a button to launch applications from a cascading menu, and a clock. If all that sounds familiar, yes, it's almost exactly like the Win95 Taskbar.

There's some nice attention to detail. Click on the clock button and the date pops up, the bar can be set to hide itself, reappearing when you move the mouse to the bottom of the screen and there's even an option to reverse the text on the buttons, so you see "Mydoc.wri - Write" instead of the other way around. This is especially useful when you have lots of windows open and the full title is too long for the button. You can tell the application from its leading icon, so its name isn't essential. Unlike Windows 95, this works with Microsoft Office. There's a Run command on the launcher menu, which, like its 95 counterpart, remembers a list of the most recently run commands. The launch button itself is titled Task Tool rather than Start, but works in a similar way — you can group programs into folders, rather like Program Manager groups except that they can be nested. About the only Windows 95 lookalike features you don't get is shortcuts to folders and the recent documents list.

The only faults I could find with it were that it caused a phantom bar to appear halfway up the screen (which went away when windows were resized), would only show the date in US mm/dd format and incorrectly reported the title of its own help file on the buttons. The version on the CD is a 30-day trial and registration is $19.95.

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NEW!

Ready, get **set**

Dale Strickland-Clark expresses concerns over extended console commands and satisfaction with multiple serial ports. Then he settles down with a good book.

I covered the delights of the console window and NT command prompt last issue, sticking mainly to the functions available in NT prior to 4.0. Thanks to recent work by one of the original NT developers, cranking out code in his spare time, NT 4.0 has been considerably enhanced in this area, with many commands acquiring some very handy extensions. Unfortunately, these extensions have had to be added in such a way as to not interfere with existing batch files, so the syntax, in places, is a little obscure. Nevertheless, I quickly found uses for many of the new features in my growing list of DOSKEY macros and batch files.

You can now count in batch files. Simple arithmetic involving arbitrary expressions is possible, so long as you can make do with integers. The SET command understands arithmetic operators if you follow the command name with the /A switch:

```
set /a count=%count%+1
set /a count=count+1
set /a count+=1
```

The above are all ways to increment the environment variable, "counter". The second example works because the system assumes that non-numeric strings are environment variables, substituting a value of zero if they don't exist — all of which is very useful in FOR statements. Consider the following command sequence,which should be on one line:

```
(for %i in (*.mid *.wav) do set /a
count=%count%+1) & echo %count%
sound files found.
```

This is intended to count the number of sound files in a directory. The FOR statement executes the command following DO for each file matching the pattern(s) in the parentheses. It might look fine until you realise that all environment variable substitution is performed before any part of the line is executed. Both occurrences of %count% will be substituted for blank (perhaps) before the command is executed.

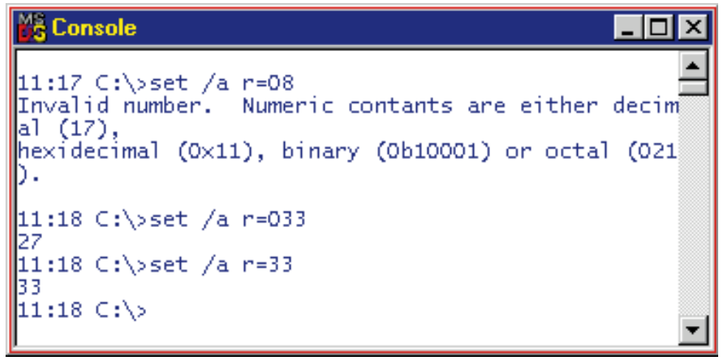
Removing the "%" from the SET command or using the format from the third example above solves part of the problem. The ECHO command, however, is still not going to work.

If the whole command is executed from within a DOSKEY macro, replacing the "&" character with $T splits the line into two distinct commands, each sent to the command handler separately. If it's in a batch file, the only solution I can find is to split the command at the "&" into two lines.

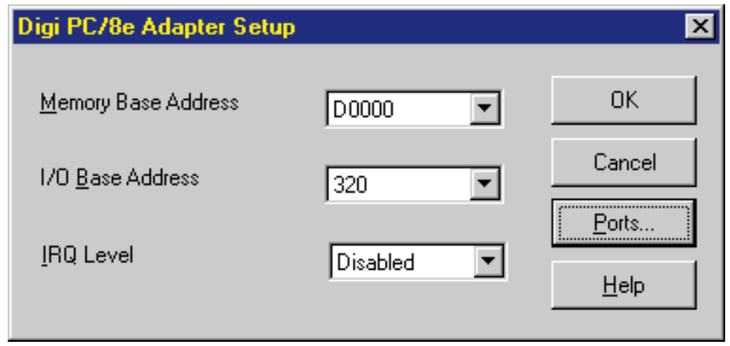
Set arithmetic operators new in NT 4

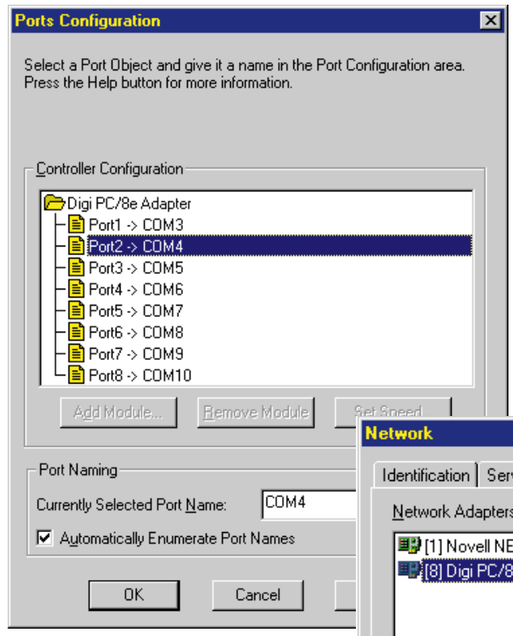
( )	grouping
* / %	arithmetic operators (% is modulo)
+ -	arithmetic operators
<< >>	logical shift
&	bitwise and
^	bitwise exclusive or
|	bitwise or
=	simple assignment
*= /= %= += -=	
&= ^= |= <<= >>=	compound assignment
,	expression separator

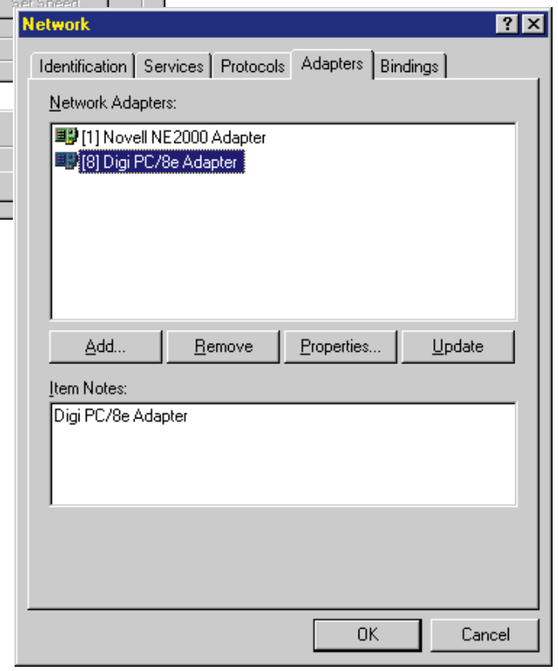
Table of operators in order of precedence. I can't get parentheses to work at all and have reported it to Microsoft



The SET command works in hex, octal and binary. The octal notation will generate a lot of fun







Above There's no IRQ to worry about, but you'll need the hardware manual or a good dose of luck to match the DIP switches with the base I/O address
Left You can map any of the Digi's ports to any COM port on NT
Below The drivers for the Digi board are in the Networking section Control Panel

The SET command supports a choice of arithmetic and logical operators plus numbers specified in hex (0x12), octal (012) and binary (0b11). Yes, you read correctly, octal numbers are identified by a leading zero. That means 012 is equal to 10 and 09 is an invalid number.

This is a remarkable cock-up. Given the new ability of a batch file to work with data read from external files or piped from other commands (a new function of the FOR command that I'll look at in a future issue), giving leading zeros the ability to corrupt your data is unwelcome, to say the least. It might have been bearable if there was a simple way of stripping leading zeros from a number, but there isn't.

I have written to Microsoft on this, suggesting a hasty change to use 0Q (zero 'Q') to introduce octal numbers. I'll let you know how it goes.

See my review of NT 4 in the September *PCW* for a list of all the console commands that have been extended. For details of specific commands, enter "HELP command" or "command /?". I'm putting together an HTML document describing all the extensions in detail and ways they can be used. It'll be on the cover CD as soon as it's finished.

Serial ports

I've long itched to resolve the irritating lack of serial ports on every PC I've used. Two is insufficient — as soon as your mouse and modem are plugged in, you're left with none. I need a minimum of four ports.

Thanks to the loan of an eight-port Digi board by The Telecommunications Manage -ment Group, near Leeds, I've had the chance to configure one of my NT systems with ten ports and, I have to say, I'm hooked.

The Digi board is one of a family of products, two of which add eight or 16 ports to a PC on a standard ISA bus expansion board. Expanding the system in this way is very convenient for two reasons. One is that this board doesn't use a single precious IRQ. The other is that the drivers are supplied with NT, making installation as simple as it could be. And I'm sure it would have been simple if I'd been given the hardware manual with the rest of the bits in the box. Without it, I fumbled around guessing at what the settings might be, but admitted defeat until I tracked down the chap with the manual.

Once I'd jotted down the DIP switch settings over the phone and correctly configured the base I/O address, we were off. I was now able to connect an old battery-powered pocket modem to the new COM3 for use as a dialler. I haven't been able to use the modem on COM2 for this purpose because it isn't connected to the same phone line as my telephone.

As a Psion Series 3a user, all my contact phone numbers are out of convenient reach of my PC, so a quick and dirty dialler was needed. A DOSKEY macro sprung to my aid:

p258 ➢

```
DOSKEY dial=(echo atdt$* & sleep
5)>com3
```

I love the simplicity of this. The sleep command is necessary to prevent the output stream to COM3 being closed as soon as the echo command is finished. It needs to be long enough for the modem to complete the dialling of the longest number you're likely to enter. Sleep is one of the little utility programs that comes with the NT resource kit reviewed last month. It is available on the internet as part of a monster 7Mb download from ftp://ftp.microsoft.com/bussys/wint/winntpublic/reskit/nt35/i386/i36.exe or, extracted for your convenience on this month's cover CD.

While the simplicity appeals to me, the limited function will soon irritate. I need to be able to interrogate my contact database on the Psion and extract entries based on a string search. The second new serial port offers tantalising possibilities to resolve this, because now plugged in here is the serial interface to the Psion Series 3a. The hassle of disconnecting and reconnecting cables meant that it wasn't often connected to a PC — just for the occasional backup. Now, however, I'm making full use of the very serviceable PsiWin software, which runs perfectly happily on NT, and have consequently rediscovered the flexibility of the Psion. In addition to the Data and Agenda applications upon which I've relied for years, I now find myself rather taken by Andy Clarkson's Plan, a project planning package that mimics and interoperates with Microsoft Project to some extent.

Use an extra serial port to connect your Psion and make use of its PsiWin software

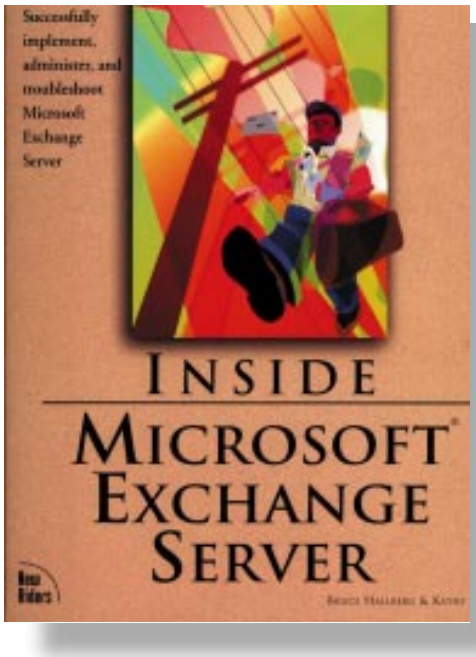
The files from the Series 3a's Data application have their own peculiar format which PsiWin will translate into text or .dbf for you, but unless you have been strict with your use of labels, identifying what's what in an entry isn't easy. The next step may need to be a Perl routine to unscramble the Data files and save them in a format suitable for a more helpful dialler, but I'm not ruling out the possibility of having to reorganise all of my Psion data files. More on this in the future.

Books

Webmaster Expert Solutions
Author Mike Morgan & Jeff Wandling
Publisher Que
Price £56.49 (incl VAT)
Pages 1140
(Includes CD-ROM)

This is, without doubt, the find of the month. Putting it simply, Morgan and Wandling have produced the definitive reference work for anyone building dynamic websites. Without getting bogged down in the specifics of any browser or any server, this book details all aspects of building a website, from improving performance, building shopping malls and handling security, to creating virtual reality worlds.

There are dozens of code examples in Perl and many complete projects, such as a web-based chat server. But don't go taking any style guidelines from these. If I had to find something to pick holes in, it would be that the authors had based their Perl style on Visual Basic.



Inside Microsoft Exchange Server
Author Bruce Hallberg & Kathy Ivens
Publisher New Riders
Price £36.99 (plus VAT)
Pages 480

Exchange Server is one of the most complex and configurable pieces of software ever from Microsoft. This is really a book for people who don't get on with the standard manuals (or choose not to buy them) because there doesn't appear to be anything here that you wouldn't find written up by Microsoft. It's a fairly light read with a chatty style, but glosses over some complex issues. For example, I could find no mention of the difficulties you're likely to experience setting up dynamic RAS connection for the Internet Message Transfer Agent.

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Trouble and **strife**

Why can't you use Windows NT Workstation to support a third-party web server? Because of a legal limitation imposed by Bill Gates. Chris Bidmead tells the sorry tale.

As I write there's a row going on — I hope resolved by the time you read this — about the licensing limitations that Bill Gates is putting on the use of Windows NT Workstation. Initially, the beta release of Windows NT Workstation version 4.0 enforced these legal limitations with a software restriction that constrained the number of unique IP addresses that could contact a web server to ten or fewer in a ten-minute period. In response to the howl of outrage from customers and competitors, Microsoft removed this restriction from the final release version of Windows NT Workstation, but retained the legal limitation set out in the software licence.

Effectively, this means that, although it is functionally capable of doing so, you can't use Windows NT Workstation to support a web server from a third party like Netscape. If you want to do that, you have to pay three times the price ($999 as opposed to $290) to buy Windows NT Server. Strangely enough, if you do this, Microsoft will throw in its own web server free of charge. Which means you'll probably be reluctant to spend an extra $300 with the likes of Netscape, buying its FastTrack web server. Netscape retaliated by sending a letter to the Justice Department complaining about what it alleged was a violation of the US anti-trust laws. The company's attorney, Gary Reback, said that Microsoft was deliberately crippling Windows NT Workstation as a way of encouraging customers to buy an all-Microsoft solution. My first reaction to this was to shrug and say, well, it's Bill's ball-game and if that's how he wants to sell Windows NT, it's entirely his affair. More power to Linux, which will not only run

Left This is Gatekeeper, the PPP front end written for NeXTStep by Felipe A. Rodriguez and distributed by freeware. Below Gatekeeper isn't just a pretty face. As you can see here, the graphical front end offers comprehensive (and comprehensible) access to the deep mysteries of PPP, and there's tons of online help.

Netscape's web server, but also in most distributions comes with its own GNU web server, Apache. No restrictions, and no charge. But the issue goes rather deeper than that. It centres on TCP/IP, the open network connection protocol on which the internet is founded. Tim O'Reilly, who heads up the O'Reilly publishing company, evidentally cares about preserving open computing. His company built its reputation by publishing highly-regarded books about Unix, and a more recent crop of books about Windows NT has been instrumental in establishing the credibility of Microsoft's new operating system in the market.

Here's what the Windows NT Workstation licence says: "...You may permit a maximum of ten computers to connect to the Workstation Computer to access and use services of the software product, such as file and print services and peer web services. The ten connection maximum includes any indirect connections made through software or hardware which pools or aggregates connections. "My italics. Putting a licence restriction on file and print services is standard practice for LANs using a proprietory transport protocol like IPX or NetBIOS.

But the internet isn't a LAN. It's truly open territory, and it uses an open transport protocol. You don't know how many people are going to be visiting your web site, and if you had to issue client licences to everybody before they could do so, the web would never have got started.Tim O'Reilly points out that the legal restriction is even more stringent than the original software dongle. "The limitation has been expanded, from 'ten users in ten minutes' (the original limitation) to 'ten users (period).' We believe that Microsoft's position amounts to nothing more than a 'land grab' in the uncharted territory of the internet."

He counters my comeback that Bill has a right to do what he wants with his own operating system by pointing out that TCP/IP, which is where the restriction lies, isn't his [Gates], or anybody's, to mess around with like this. "TCP/IP is not a Microsoft product, and I don't believe Microsoft has the right to tell application vendors and users what they can and can't do with it. TCP/IP is a fundamental service for internetworked systems."

To hammer home this argument he concludes: "If you accept that Microsoft has the right to tell users how many sockets their applications can have open, you must also accept that they have the right to tell users how much memory their applications can use, or how much processing power."

Netscape is angry because its business is being threatened. Tim O'Reilly is angry because a principle is being violated. I've been known to get too hot under the collar about issues like this in the past, but this time the most action it gets from me is a quick shrug. It's not that I don't believe O'Reilly is right. Of course he's right. The point is, Microsoft's behaviour over this licensing business simply confirms what I've long suspected. When it comes to the internet, despite his much-publicised 180-degree turn at the end of last year, Bill really doesn't get it. As the old Bob Dylan song says: "Something is happening, but you don't know what it is. Do you... Mr Jones?"

At the end of 1992, Microsoft launched a product called Windows for Workgroups. It was NetBIOS joining a bunch of local machines together. The machines all ran Windows, and Bill owned Windows and he owned NetBIOS. It seems like a hundred years ago. Only a few months after that launch, the Mosaic web browser arrived and we all clamoured to get onto the internet. Now, for the first time, our desktop machines were properly connected. Globally. And it no longer mattered what operating system you were running. TCP/IP wasn't just another protocol, like NetBIOS, added to the operating system. It was the other way round. The operating system you happened to be running on the machine in front of you became simply the interface to the main action, carried out in the vast worldwide arena called TCP/IP. It was as if we'd all gone to the cinema and had been sitting in the dark for fifteen years, thinking how comfortable our seats were, or not. And then the film started.

This is what Bill doesn't get. By imposing these kind of restrictions on Windows NT Workstation, he is a tail trying to wag the dog. Either his customers will walk, across to Linux, perhaps, or a third party like Netscape will supply a TCP/IP stack not written by Microsoft that will arguably take the right to restrict clean out of Bill's hands.

Or perhaps people will just ignore the licensing issues. In which case, Bill may well send out agents across the internet to sniff out offenders, and maybe drop writs on their web servers in the form of a Word for Windows macro virus. It will all get very silly and make more lawyers rich. I return to my first thought: this has got to be good for Unix.

Ray Noorda still going strong

Microsoft is under attack now from another quarter — a writ from Ray Noorda, the programmer turned billionaire who built Novell up from nothing all through the eighties and is now the force behind Caldera. Caldera has just bought NDOS, the Novell version of DOS that was originally developed by Digital Research Inc. DRI was the company whose 8-bit CP/M operating system helped microcomputers grow from toys to business tools before the arrival of the IBM PC.

Caldera's claims about Microsoft's "various unfair and predatory acts" by which the industry was force-fed with MSDOS to the detriment of competitive products all

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Caldera

Last month I mentioned System Commander, the handy multiple boot utility distributed in this country by POW!, a Dorset-based distribution company. It's headed up by (and I suppose named after) an old acquaintence of mine called Daniel Power. One of the best things about writing a column is that you get old chums popping up out of the blue like this, and it's doubly pleasing when they turn up with a product as good as System Commander.

But it's best of all when I hear from people who have actually been reading the column. Daniel gave the game away with a follow-up missive, which I'm going print in full here just for the hell of it.

From: dpowera@cix.compulink.co.uk (Daniel Power)
Subject: System Commander
To: bidmead@cix.compulink.co.uk
Cc: dpowera@cix.compulink.co.uk
Reply-To: dpowera@cix.compulink.co.uk

"Are you interested in Linux derivatives/Intranet servers? I am in the process of launching a reworked version of Linux with an X Windows interface, free Netscape etc. The installation is simple, the product more accessible to the end user. It will cost 99 pounds. The product is from a company called Caldera. I don't know if you know anything about them but it is a project that was dropped from Novell and is now funded by the Ray Noorda family trust fund."

I wrote back to tell him to say that, well, yes, my readers and I have been tracking Caldera for about 18 months now, and know it quite well. But a UK source is always useful, especially if you're offering some kind of support. Unfortunately, POW! isn't in a position to do that yet, so the product is being distributed through Lasermoon for the time being. Here are the details:

Lasermoon <sales@lasermoon.co.uk> Phone 01329 834944
Caldera Network Desktop £70 (plus VAT)
WordPerfect plus Motif Licence £166 (plus VAT)
Internet Office Suite £250 (plus VAT). Includes WordPerfect, Nexus spreadsheet and Zmail

Daniel tells me that the best email address for his own company is sales@pow-dist.co.uk, and they have a website at www.pow-dist.co.uk. Full details of Caldera are on the Caldera web site at www.caldera.com.

Noorda: Has issued a writ on behalf of Caldera, claiming that Microsoft, with the total domination of MSDOS, virtually hijacked the eighties

through the second half of the eighties and beyond will strike a familiar chord to anyone studying the current Windows NT Workstation licensing affair. Ray Noorda seems to have a couple of genuine business aims here, as well as punishing Microsoft for its past misdemeanours. He wants to be able to reinstate Digital Research's DOS as part of the Caldera Linux distribution, strengthening its powers as a "network desktop"; and he wants guaranteed disclosure by Microsoft of "all APIs for any operating system it produces, as well as any modifications, enhancements, updates, or new versions of such operating systems at the time that such products are released for beta testing." This fits with Noorda's plans to enhance Linux to the point where it will be able to run Windows applications.The ramifications of this are vast, and there isn't space to rattle on about it here.

If you want to know more, the whole legal case, with a history of "Microsoft's Growth and Domination" and Caldera's "Claims and Prayers for Relief" can be read on http://www.caldera.com/news/complaint.html.

Readers write

Long-suffering readers will remember that back in May of this year I ran into an absurdly simple problem with Unix that may well baffle anybody coming to the environment from DOS or Windows. I'm talking about the business of batch renaming files. In Unix you don't, philosophically, rename files — you move them. The same command, mv, is used either to shift a file from one directory or another, or to change its name. This, in itself, takes a little getting used to, but it gets worse when you start looking for an equivalent of DOS shortcuts like REN *.BAT *.BAK. Because Unix doesn't handle batch renaming like this.

The solution I stumbled on was to use the FOREACH command — roughly the equivalent of the DOS FOR batch command. It works like this:

```
> foreach f ( *.tiff )? mv $f
$f:r.tif? end
```

This works fine, but is a little long winded because the foreach command is actually a mode that you enter, throwing up its own prompt (the question mark) and requiring the keyword "end" to exit. Great for Unix buffs, but what my simple, DOS-educated spirit craved was a one-liner. As luck would have it, a Unix buff has responded to my plea. The solution, as you've probably guessed, is a shell script that takes care of the multiple renamings and can be tailored to handle the parameter you pass it to suit your taste.

I like the script that Dr Rich Artym <rartym@galacta.demon.co.uk> has sent me, because it exemplifies one of the things that appeals to me most about Unix: the ability to make it work the way you want it to work. Of course, you need to understand something of the arcane machinery below the surface to do this properly. Two O'Reilly books, *Using csh & tcsh* and *Learning the bash Shell*, have been invaluable foglamps for me as I grope my way through the murk.

The Artym solution to batch renaming can be found on this month's cover CD.

Where does UNIX begin and end?

After much discussion, we've settled on calling this column just plain "UNIX". I suppose this avoids any ambiguity (one proposal from a *PCW* staff member was "Hardcore Computing"), and certainly the venerable operating system is the basis of my thoughts and researches here.

But I wouldn't want you to feel that we are in any way ghetto'd by the new title. The spirit of the column reaches far, er, rambles, some might even say, over a wide range of computing issues that tend to be neglected by the Windows-centric mainstream computer press. A great deal is happening "outside the Gates", as I tend to think of it, and some of it is even happening here on my own network. Not that Windows is excluded — how to keep the really good stuff like my NeXT workstation connected to the merely useful world of Windows is an issue I'll continue to pursue. And I hope you'll stay with me as I do.

PCW Contacts

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It's a **long** story

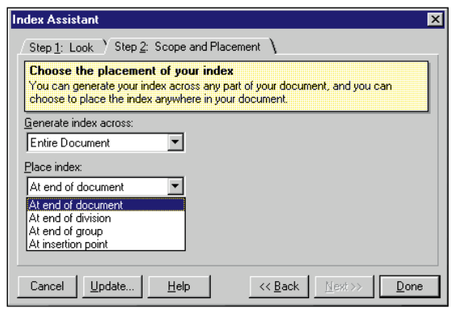
Long documents, and why the current crop of word processors are really rather good at them. Plus, some points about WordPerfect. With Tim Phillips.

Much of the criticism of Word for Windows, WordPerfect and Word Pro centres on the fact that they do too much and are just too complicated for most people to use. This is borne out by one incident during my time as a freelance journalist when I was writing for a rival magazine. The publication decided to check the usability of the top half a dozen word processors, and so devised a series of simple tasks that represented a run-thorough of the most common features of the modern Windows word processor: formatting, printing, spell-checking, mailmerging and so on.

The usability testers were hired from a temp agency for the day; intelligent, qualified typists with some experience of word processors. No-one was put on a word processor they knew. The person in charge of testing gave them their sheet of tasks, then left them to it. By lunchtime, no-one had successfully completed more than two tasks. "It's too hard!" they said.

It's the old 80:20 rule again. 80 percent of your work uses 20 percent of the package's features. Or is it that 80 percent of people use only 20 percent of the features? Or that only 20 percent of people know how to use 80 percent of the features? Or that 80 features are only used by 20 people? Whatever. There remain a host of features on your word processor you have never even considered. Look down each menu bar in turn, and count the number of functions you have never used, perhaps never noticed, before.

Word for Windows one-pass indexing, not the easiest to use, but pretty comprehensive



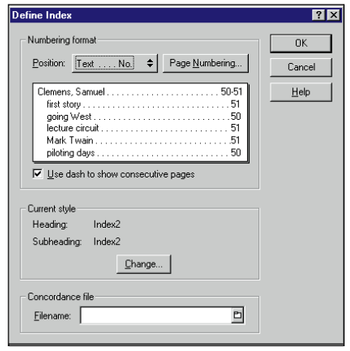
The index assistant for Word Pro needs a preview function, but indexing is powerful

Indexing for beginners

Ever bought a computer book and wondered why the indexes are so huge? These guys index for fun. It is, by any standards, almost too easy. Where's the challenge in that?

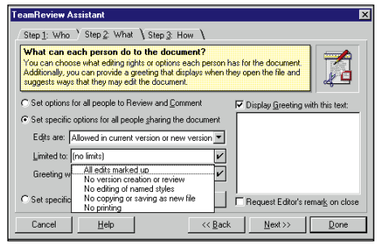
WinWord has a typical Microsoft straight-to-the-point solution. Go to Insert, Index and tables, and up pops a floating dialogue box with four tabs, to take care of a contents page, an index, a table of figures and a table of authorities. There's few enough of us will use all four. There are seven styles plus a style editor with a preview, so it is easy to see how your index will look. Once you choose the style (including tab leaders and the option to justify numbers) it calls up a box allowing you to mark entries. As you mark each entry, the box stays on top and the index generates itself.

Word Pro generates the index as a two-stage process but has more support for making "sub-indexes" in the middle of a document, and is more flexible for power functions, if less for display. The indexing dialogue box anchors to the bottom of the toolbar, neatly out of the way. You can easily leave it there while you write or assemble a document, unlike WinWord's box and, when marking words to be indexed, it gives you the choice of whether to have them in the index or the contents. Despite its four-tab dialogue box, WinWord forces you to each separately. When you finish that part, you call up the "Index assistant", which should help you format your index. But without previews of how the index would look, and without the opportunity to right-justify page numbers, it's a bit of a let-down in visual terms. You can, however, put the index anywhere in the document you wish.



Above Defining an index in WordPerfect is fussier, but it is probably the most feature-rich
Right Word for Windows doesn't major on comment field. This is the best it can do

Above WordPerfect has a much better-looking option.
Right The WordPro TeamReview assistant - complicated but powerful.



More on long documents: revising and annotating

Another useful long-document feature is the chance to mark up edits and comments, especially when more than one person wants to see the document. When I write a long piece I usually don't know one or two facts, but instead of stopping to look them up, I leave a marker to say "don't forget to look this up later". Word is spectacularly poor at this sort of editing, instead assuming that you will want to make a hidden "annotation" to your document. The only way to see these annotations easily is to leave the annotation window open at the bottom of the screen, where the annotations pop up as you pass them. This is a very unsatisfactory solution.

By contrast, Word Pro has every conceivable type of group review and annotation scheme, enough to make your

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head hurt. Starting on the File menu, there's the format scheme for passing a document around a workgroup, called TeamReview. You can set the names that the document is passed to. If you enter those names as email addresses or network logins, it makes passing the document more simple. You can set what type of access people have to the document; whether they can change styles, content, or just look at it. And finally, there's TeamConsolidate where you work out how to reconcile all the annotations.

Then there's the Lotus idea of versions, by which more than one copy of the document is stored in a file. Each version is named and dated, and cannot be changed. A new version is created instead. This is good if you are working on the document alone but want to create several ideas to pass on for review. If you use TeamReview with a versioned document, I challenge anyone to get their heads around the data that comes back.

For simpler tasks, WordPro has the "Comment Note" and, if you don't want to do that workgroup stuff, this is fine. Adding a comment note pops up a yellow square, into which you type your note. It signs and dates the note according to who the software is registered by and, when the note is closed, adds a yellow blob to the document. Simple, quick and effective.

WordPerfect has a similar yellow blob scheme, but its blobs are grey and appear in the margin as small talksbubbles. Click on the talksbubble and it pops up into a bigger one, anchored at the insertion point of the note. When writing a comment, it gives you buttons to press to insert your initials, the date, the time or your name. Again, excellent.

Less impressive is the lack of a facility to mark revisions before making them. Word and WordPro both have a switch to toggle on by which your deletions and edits are simply marked up in another colour or struck through with a line. WordPerfect needs a function like this.

WordPro has the most functions but the most headaches. Word is hopeless. WordPerfect does what it does well.

There's a lot more to creating long documents, like handling styles, inserting objects, files and fields, but no room to discuss it here. I do recommend that you start that book you have been promising yourself though, because it really makes you like your word processor a lot more.

You can't please everyone

I hope this helps to pacify Peter Burgess, who wrote to me after my recent remarks on WordPerfect to allege that "you have no idea what you are writing about". Well, I have a broad back, but the points he raises bear some examination.

On the subject of internet awareness, he asks: "Can you tell me of any other word processor that is as integrated at the moment?" Well, yes. Look at the degree of commonality between Word and Internet Explorer 3.0, where you can use the browser to pass Microsoft Office files without using FTP, and you will see what I mean.

"WordPerfect tables have always surpassed those in Word, as do many of its other functions." On balance, I agree. "Do tabbed dialogue boxes really make a program any better? Pretty, maybe, but I wouldn't be lost without them," he adds. Yes, by providing a single "console" for related functions like formatting, a tabbed dialogue box saves a huge amount of time. Where they are a con is in grouping functions that can't be used together. Look at the explanation of indexing and Table of Contents generation above.

I do take Mr Burgess' point that "it would be a shame to lose this calibre of competition in this segment of the market." He's right. WordPerfect may not be without certain faults, but all three of the major packages are excellent pieces of software.

PCW Contacts

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CompuServe 104047,2750

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Tim's Macro Club

Not much space for macros, but a very useful one for Word 7 users from Dave Wade. Send us your address, Dave, and there's a book token for you.

"I know that MS Word only masquerades as an MDI application and is not really one. However, if it is going to pretend, it would be nice if it did it properly," he starts. Fair play to Dave. "I frequently edit multiple documents, and having to use the Window menu to switch to the next seems a real pain. Why does it not support Ctrl+Tab like every other MDI application!"

He solves the problem with a simple macro:

```
Sub MAIN
‘ macro to navigate round the
window list
‘ find current window
i  = Window()
‘ is it the last
If I  < CountWindows() Then
‘ no get next
       i  = i  + 1
Else
‘ yes get first
       I  = 1
EndIf
WindowList I
End Sub
```

But, you can't assign this macro to Ctrl-Tab. Word doesn't allow it. So it takes another macro:

```
Sub MAIN
‘ set i to scan code for ctrl+tab
i = 256 + 9
ToolsCustomizeKeyboard .KeyCode = i, .Category = 2, .Name =
“NextWindow”, .ADD
End Sub
```

"I ran it once and bingo — Ctl+Tab now rotates around documents. What is more, as key mappings are stored in the normal.dot template, you only to run it once," he adds.

Now a challenge for users who liked the crossword solver macro in the August issue. From John McCulloch:

"I wish to increase the number of words which are returned in the search results. Currently it is limited to 20 words. I realise that the 'Dim outarr$(20)' array will need modifying and I have tried increasing this, but it hasn't made any difference. 20 resulting words are still returned as a maximum." Solution, please!

Two **sheets** to the wind

Hello sailor! Our very own old seadog, Stephen Wells, navigates the choppy waters of a reader's sailing handicaps. That old pension problem welcomed him back to dry land.

It is a pet theory of mine that 12-year-olds are more at home with computers than 42-year-olds because they like simple answers: yes and no, right and wrong, black and white. I often find that spreadsheeters write VBA macros when a spreadsheet's functions will do the job faster, or struggle with functions when the problem can be solved by formatting.

Take weekend sailor Michael Samuelson of the Isle of Wight. Seldom known to get his sheets in a twist when tacking across to Cherbourg, Excel 4 gave him mal de mer when he tried to calculate sailing handicaps.

I've dressed up his worksheet a bit using Excel 7 (Fig 1), but it illustrates his problem and the solution. What he wants to do is subtract a Start Time from a Finish Time and get an Elapsed Time. And then multiply that by a Time Correction Factor and produce a Corrected Time.

Mike was trying to separately multiply the hours, minutes and seconds and getting nowhere. Let go of the tiller and trust Excel, I said, when I tracked him down at his sailing club. Just format every column that has Time in the heading in a time format, and format the correction factor column in a number format. Then make a simple subtraction for the Elapsed Time and a multiplication for the Corrected Time. In Fig 1, the formats and entries are spelled out in rows eight and nine. Another happy buoy.

Fair set the wind for Excel, which sailed the calm waters of Elapsed Time and Corrected Time

Microsoft Excel - Sailing.xls

File Edit View Insert Format Tools Data Window Help

	A	B	C	D	E	F	G
1							
2							
3		Boat Name	Start Time	Finish Time	Elapsed Time	Correction Factor	Corrected Time
4							
5		Flyspray	14:10:10	16:13:14	2:03:04	1.046	2:08:44
6							
7							
8							

Fig 1 If you get the formatting right, Excel will calculate elapsed periods of time and correct them with factors

That pension problem

In the August column I reported the long, complicated IF statement formulas that pensions consultant Richard Jones is using in Excel 5 to define the number of years and calendar months between two dates. The complicating factor is that his company only wishes complete months to be counted. I asked readers for more simple solutions and received many responses. I checked all of those which were actually shorter, and not wrapped in pages of explanatory notes. If a solution produced the same answers as Richard, I deemed it successful. The example periods and Richard's answers are shown in Fig 2.

	A	B	C	D
1	START DATE	END DATE	YEARS	MONTHS
2	1-Mar-82	20-May-96	14	2
3	1-Sep-23	1-Jan-97	73	4
4	6-Jan-35	13-Apr-96	61	3
5	30-Sep-46	7-Jan-96	49	3
6	1-Sep-49	1-Jul-99	49	10

Fig 2 The test start and end dates, and the required answers to the pension periods problem

The neatest and most simple solution came from Paul Carter, headteacher of Frithville Primary School, Boston, Lincolnshire. He easily earns a book-token prize (which he's giving to his school) because his formulas were easy to enter and worked first time, and his email of explanation was so brief I can quote it in its entirety: "I use these formulae to calculate chronological ages for comparing test results for the children I teach. The first gives whole years and the second gives completed months."

```
@INT(@DATEDIF((A2),(B2),"m")/12)
@MOD(@DATEDIF((A2),(B2),"m"),12)
```

Ironically, this doesn't help Richard Jones, who uses Excel 5. I can't find any equivalent to the @DATEDIF function in Excel.

As I obviously couldn't specify that Excel had to be used, and many other contest-ants apart from Mr Carter provided Lotus 1-2-3 solutions, I'm going to call *that* the 1-2-3 prize and award a second book token to the best of the many Excel solutions.

That came from Bill Bridge. Whether he knew it or not, he created an Excel function that replaces the @DATEDIF function.

Note how similar the formulas used in the years and months cells are to Mr Carter's:

```
=INT(elapsedMonths(StartDate,
EndDate)/12)
=MOD(elapsedMonths(StartDate,
EndDate),12)
```

The block of cells used for entering Start Dates are named StartDate. The block of cells used for entering End Dates are named EndDate. The formatting for the years and months columns is just General.

The listing for the created function is shown in Fig 3. I know what I said at the beginning about VBA macros, but they have their place and this is one of them.

Bill created the module in Excel 5 under Windows 3.11 but he sent it as part of a workbook file attached to his email, and it opened for me with Excel 7 under Windows 95. I am most grateful to all the readers who sent in other solutions and ask you not to be discouraged — all your contributions are appreciated.

```
Function elapsedMonths(fromDate As Date, toDate As Date)
    Do While toDate >= DateSerial
(Year(fromDate), Month(fromDate) + elapsedMonths, Day(fromDate))
  elapsedMonths = elapsedMonths + 1 Loop
  elapsedMonths = elapsedMonths - 1End Function
```

Fig 3 The VBA module listing to create the elapsedMonths function used for calculating periods

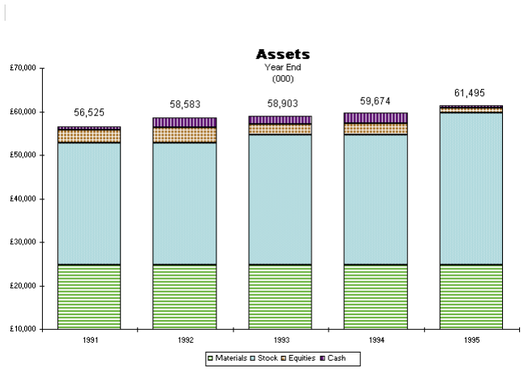

Fig 4 You can add totals to the top of stacked columns of data by creating a dummy series

	1991	1992	1993	1994	1995
Materials	24,750	24,750	24,750	24,750	24,750
Stock	28,000	28,000	30,000	30,000	35,000
Equities	3,022	3,558	2,306	2,524	1,006
Cash	753	2,275	1,847	2,401	739
	56,525	58,583	58,903	59,674	61,495

Fig 5 The data used to create the chart in Fig 4. Totals have been added to each column

Just a dummy

Here's a neat trick for adding totals to a stacked column chart in Excel as in Fig 4.

Add a totalling row to your data table, Fig 5. Select this complete block, including labels and totals. Then choose Insert, Chart, As New Sheet. In Step 2 of the displayed Chart Wizard select Column, then Type 3. Accept the defaults in Step 4 and add a title in Step 5.

Right click on the top data series. Choose Format Data Series, Data Labels, Show Value. Your totals will appear, but your columns are twice the height they should be. Choose Patterns, Border, None, and Area None. This will conceal the extra dummy data series.

Right click on the Y-axis, choose Format Axis, Scale and pick appropriate Maximum, Major and Minor unit values (instead of the default, Auto). If your new totals disappear, choose View, Sized with Window. They'll reappear above the chart title. Drag them down into position.

Finally, format the placement of the legend, if you wish, and add a clarifying subtitle. Make any improvements you like to the width, colour or pattern of the columns by selecting Format Data Series on the shortcut menu.

I've used Excel 7 here, but with slightly different menu options, you can accomplish this in versions 4 and 5 too. Once you're

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familiar with the method, you can produce the result in less than a minute.

Accounting for inflation

I recently had to create a small database of household valuables for insurance purposes. This takes a certain amount of guesstimating for current value, but a small spreadsheet helped (Fig 6).

I've added notes to show the formulas and formatting used in Column B. The average rate of applicable inflation varies by type of item. The formula in cell B10 will work with depreciation as well as inflation, so you can enter a negative inflation rate in B4. You need this with computer hardware! Subject to judgement and advice you might use three percent inflation for some classes of books and furniture. This worksheet doesn't substitute for expertise: it just saves a lot of individual entries on a calculator.

Excel offers functions for calculating depreciation. DDB returns the depreciation of an asset for a specified period using the double-declining balance method. You can calculate the straight-line depreciation of an asset for one period with SLN. SYD uses the sum-of-years' digits method.

Lotus 1-2-3 offers these three functions plus DB which uses the fixed-declining balance method of calculating depreciation. But I've spent my money so wisely that, apart from PCs and printers, clothes and lawnmowers, everything I've bought has gone up in value not down.

Growth of investments

Suppose you are offered a choice of investments. They might be in property or savings accounts. You know how much you have to invest, and how much you expect to receive from each investment at the end of differing periods. What you need is a consistent method of estimating your return. In some industries this is called the average growth rate. In others, it's the annual yield rate or the average rate of return.

The variables can be defined as FV for future value, PV for present value, N for the number of investment periods (meaning the number of times the yield is added to the capital and compounded, or carried forward) and P for periods (or how many Ns there are in a year).

To clarify that, I'll give some examples. If you invested £1,000, stood to collect £10,000 after 10 years, and the investment was compounded annually, then

```
FV=£10,000; PV=£1,000; N=10; and P=1
```

If you invested £1,000, were promised £5,000 after 5 years, and the investment was compounded monthly, then

```
FV=£5,000; PV=£2,000; N=60; and P=12
```

Leaving aside factors like risk or patience, which would be the most rewarding investment? Well, the first example would need an annual yield rate of 25.89 percent, and the second 20.11 percent.

The formula is =((FV/PV)^(1/N))^P-1. If you might use it a lot, it's easy to create a function. In Excel 7, just right-click on a tab in your workbook and choose Insert, Module. Enter the brief listing in Fig 7.

When you need it in your worksheet, put an equals sign in the selected cell (which has been formatted as percentage), click the fx button, and the Function Wizard will offer you the new function under the User Defined category.

You can call the new function anything you wish, but don't call it GROWTH like I did. I couldn't understand why the formula worked but the function didn't. I emailed Michael Rickard, a friendly occasional VBA adviser, who pointed out that Excel already has a GROWTH function (for fitting exponential curves). Microsoft should include a trap so that Excel tells you when you've picked the name of an existing function.

Covering myself

Back issues of this column are now included on the cover CD. Starting this month, worksheets which include macros and formulas are there too. Under Resources, look for the Excel 7 files: Sailing.xls, Periods.xls, Assets.xls, Inflation.xls, Growth.xls; and the Lotus 1-2-3 file, Periods in 1-2-3 V5.WK4.

EXCELlent shortcuts and longshots

DISPLAYING MULTIPLE SHEETS To view more than one sheet of your workbook at a time, click the tab of the first sheet to view, choose Window, New Window. Then Window, Arrange. Select Tiled, and check the Windows Of Active Workbook option; OK. The title bars will show the name of your workbook and a number, based on the number of open windows. If tabs were visible before, they will still be visible, so you can change sheets in each window.
FINDING FILES Excel 7, like all Windows 95 applications, offers sophisticated search facilities. Say you know you have a file called Expenses 95 somewhere but can't find it. Choose File, Open, Advanced. Delete the default search criteria. In the Look-in box choose C: D: or A:. In the Property box choose File name. In the Condition box choose Includes. In the Value box enter Expenses. Check the Search subfolders box. All files with Expenses in the name will now be listed. You could also narrow the search by a date or choose from many other search options.

A	B		
		ENTER	FORMAT
2 Purchase Price		£72.50	Currency
3 Purchase Date		22/6/65	d/m/yy
4 Ave. inflation per yr. (%)		3	Number
	FORMULA		RESULT
6 Today	=TODAY()	2/10/96	d/m/yy
7 Purchase Year	=C3	1965	yyyy
8 This Year	=C6	1996	yyyy
9 Years Old	=YEAR(C8)-YEAR(C7)	31	Number
10 Value Price	=C2*(1+C4/100)^C9	£181.26	Currency

Fig 6 **A simple worksheet for calculating present estimated values for insurance coverage**

```
Function AYR(FV, PV, N, P AsInteger)
AYR = ((FV / PV) ^ (1 / N)) ^ P - 1 End Function
```

Fig 7 **The VBA module listing to create the AYR (Annual Yield Rate) function used for comparing investments**

PCW Contacts

Stephen Wells welcomes comments on spreadsheets and solutions to be shared, via *PCW* Editorial at the usual address or at **Stephen_Wells@msn.com**.

Files can be attached if you're on MSN or Demon.

One is not enough

A reader worries that as the work gets too big for his company's current database system to handle, which way now? Mark Whitehorn is on hand to dispense this, and other, advice.

I would like a discussion of the relative merits of a client/server database and a networked database application in which there is a server. When working on database applications, I am always considering small standalone systems for one PC. Most of our work so far has been in-house and thus manageable. As time goes by and we are involved in increasingly big projects, I am beginning to worry that the one-PC approach will fall on its face.

I believe I have two options:
1). Put my data on a big server running something like NT and run multiple copies of my Paradox application all pointing at the tables on the server. Then let Paradox handle the problems. I realise I'd have to be careful about record locking and the like.
2). Up-size my data to a client /server application using something like Interbase running on a server (UNIX?) and do it all through SQL, although my knowledge here is very hazy."

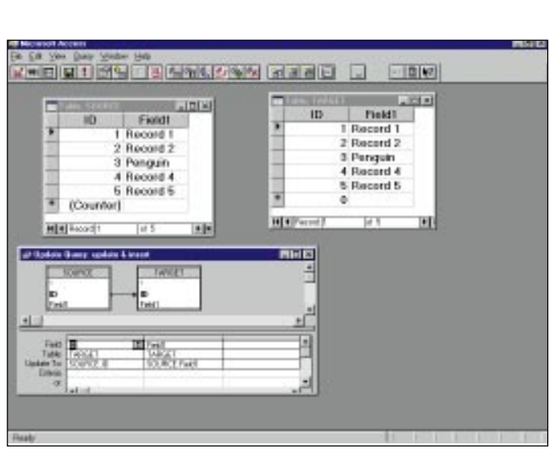
Alasdair Macdonald

I received this email and it seems a broad enough question, to warrant some expansion. After all, it is one of the biggest decisions that you are likely to make, and is an area where mistakes are both common and expensive. There are essentially four database models you can employ:
1). Everything on a standalone PC.
2). PC front-end — data on file server.
3). Client server using a database server as the back end.
4). Mainframe

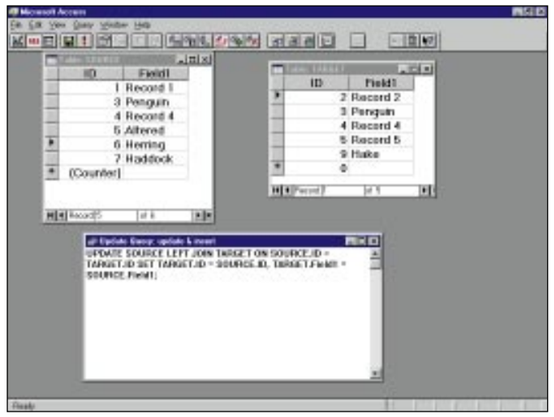
The fourth seems inappropriate for discussion in a PC magazine, so we'll ignore it. What I can do here is to outline the strengths and weaknesses of each of the other three, together with approximate performance and size estimates.

This is a complex area. The decision to choose one of these alternatives will be based upon the interaction of many factors, including response time required, number of users, file size, file number, data size, available resources (including hardware, software and money) and type of data access required (read only, read write).

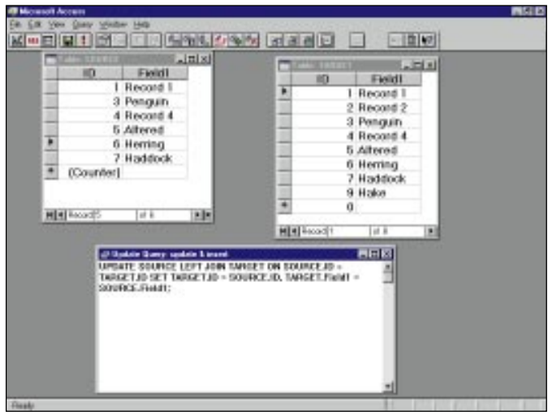
These factors interact in complex ways. Suppose that your system definition makes multi-user access to the data essential: you can instantly rule out a standalone PC. If the number of users is guaranteed to be small (say, three), then on a given hardware



(Fig 1, top right) **The update query described by Paul [see page 276]. The two tables are the same**



(Fig 2, right) **Here I have made changes to both of the tables, but have yet to run the query. (I have also altered the view of the query to show it in SQL)**



(Fig 3) **The state of the tables after the query has been run**

platform you could allow those users to access a greater volume of data than if there were 50 of them. If the number of users did then increase, the system might still work, but the response time would drop.

To make matters worse, the interactions between these factors are often non-linear: for example, doubling the number of users on a given system might have little impact on response time. Doubling it again might bring the same system to its knees.

It's easier not to give any actual figures, but this is likely to leave you gnashing your teeth and wondering "What exactly counts as 'lots'? Three? Twenty five? Five hundred?" On the other hand, if I do quote hard figures, like saying that you shouldn't consider using a standalone PC for more than 1Gb of data, there'll be someone out there happily using a 200MHz P6 with 1024Mb RAM to access 1.5 Gb.

I will quote figures because it seems far more useful to do so, but please just regard them as general figures from which to start discussions. Please don't take them as gospel, and please don't build your entire database strategy around them alone.

Work alone on a standalone

The simplest database model is to install everything on a standalone PC. You use an RDBMS like Access, Paradox, dBase and FoxPro to manipulate the data.

Only one person can use it at a time, and I wouldn't use this sort of system for more than about 1Gb. Factors which affect this figure are the hardware (more memory equals larger data files) and the manner in which the data is used. For example, if it's rarely updated, then it can be heavily indexed and queries should run against it reasonably rapidly. If the data is constantly updated, the indices will slow down the updating, and yet removing them will slow down the querying! In a nutshell, if the data is rarely updated, heavily indexed, and you have very impressive hardware, you can go above this limit. With a 286 with 640Kb, don't even think about it.

The major advantage of this sort of system is that it is cheap, and easy to manage. A database can be thought of as four different parts:
1). User interface section.
2). Data processing engine.
3). Conflict resolution section (to deal with conflicts introduced by multiple users accessing the data at the same time).
4). The data itself.

In a standalone PC-based database there is only one user, so the conflict resolution section isn't required and the other three appear as a single, seamless entity to the user. Simple. In fact, it is *so* simple, why would you ever want to go to anything more complex?

One of the major reasons for moving to a more complex database model is that this one cannot handle multiple users. For one thing, there is only one keyboard, so we can expect fist-fights if we try for multi-user. Also, this model doesn't allow for conflicts between the requirements of different users to be resolved. If you need more than one user to access the data at the same time, it is time to split up the components described above and partition them between different machines. This leads us to the second database model, which we'll cover in the next issue.

Target, aim, fire!

"Suppose we have one table, called Source, containing new records, and another table called Target. We wish to insert into Target the records in Source that are not already in Target, and update those records which are already in both tables to

p276 ➢

Database Systems
by Paul Beynon-Davies

This book looked promising. Many of the subjects covered are of interest, and the style, while a little formal for my tastes, is perfectly respectable. However, reading it in more depth reveals a series of unnerving flaws. For a start, the book is heavily cross-referenced. I like cross-references, but I do like the references to point to the correct place. Far too many here do not. Exactly half of the cross-references in chapter six, for example, are incorrect. With a failure rate like that, they are too frustrating to use. And it is not only the cross-references that are flawed.

The same chapter covers SQL and the author demonstrates retrieval, ordering and grouping for which he uses a base table, eight SQL samples and eight answer tables. Amazingly, three out of eight answer tables are incorrect, a state of affairs likely to induce severe confusion in a novice reader.

This book is aimed at students, but cannot be recommended to them or anyone else, which is sad because in many ways it's a fine book. It is simply crying out for a careful revision. Hopefully the next edition will be improved, but steer clear of this one.

MacMillan Press ISBN 0-333-63667-8. £19.99

the values of the records as in Source.

Instinctively, programmers will achieve this by two queries:

1). Update

2). Insert

In Access it can be achieved with a single Update query with a LEFT JOIN.

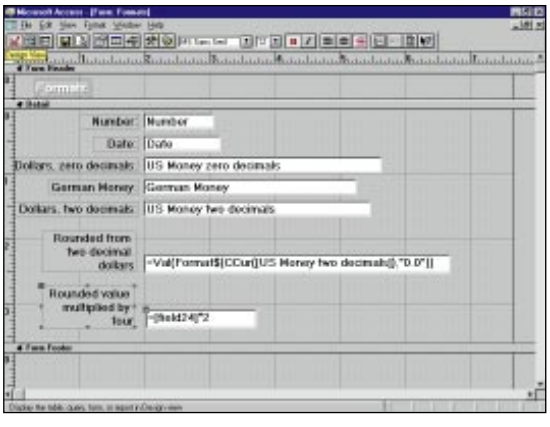
```
UPDATE SOURCE
LEFT JOIN TARGET ON
SOURCE.ID = TARGET.ID
SET TARGET.ID = SOURCE.ID,
TARGET.Field1 = SOURCE.Field1;
```

Note that both tables have fields called ID and Field1, and both are of the same data dimensions in each table. Remember that if ID is a counter field in Source, it must be a long integer in Target. This works, since Access matches those records in Source which are not in Target with a Null Record in Target which can then be updated. From an SQL point of view, this technique may not work in other DBMS but is jolly useful in Access 2.0 and Access 7.0.

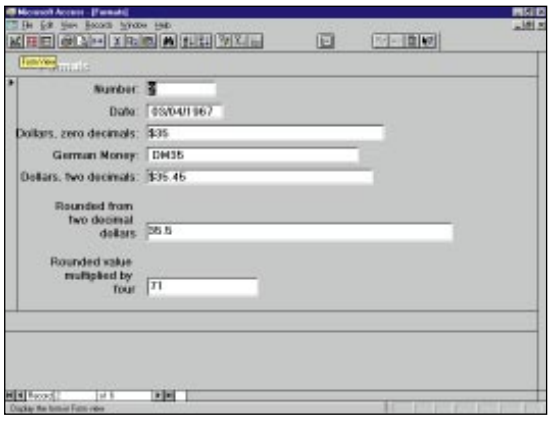
I enclose a sample Access 2.0 database [on the cover disk as pdbdemo.mdb] which demonstrates this. To see it in action, play around with appending/changing records in Source and then run the query to see the effects in Target. The uses of this technique are numerous, and variations on the query to supply selection criteria make it powerful."

Peter Blackburn

It is worth noting that this query will not delete records from Target which have been deleted from Source. This is not a criticism. If it did delete those records, it would effectively be replacing Target with a copy of Source. It is simply a characteristic of this type of query. I can't help feeling that this might help in the solution of last month's problem concerning Mark Squire's problem about Customers and Items.



(Fig 4, right top) Here I have used some of the formats suggested by Paul, and his rounding mechanism



(Fig 5, right bottom) And here is how the data appears. Notice that the value shown by the rounding mechanism is still a number; it can be mathematically manipulated as shown in the lowest "text" box. This form is also in the sample database on the cover disk

Currency codes: help wanted

"Your July column covered the formatting options for dates in Access.

It is often overlooked that the Format property in Table, Query, Form and Report design is not restricted to just those formats on the list. The variety of codes available is the same as those used in Excel's Format, Cells, Number dialogue box.

Thus, a code of dd/mm/yyyy will show dates with century, $#,##0 will show amounts with dollar signs, "DM"#,##0 will show amounts in deutschmarks. This latter is especially useful since Access picks up the default currency format from Control Panel. It can then be overridden to show different currencies on a single Form, etc.

The ability to override the currency format has an additional benefit. Since currency fields are held to a fixed four decimal places internally, they are likely to be more precise than single or double numbers which can give puzzling rounding errors. As you know, Access has no exact equivalent to the =Round function in Excel. Currency fields used for other than currency can be formatted as #,##0, or #,##0.00 if two decimal places are required.

Incidentally, to get round the lack of an =Round equivalent, I use the Format$ function. This converts numbers to text, but rounds properly as we know it. With a representative sample of nearly 3,000 records, the following nesting of functions gave correct rounding when calculating VAT:

```
RoundNo = Val(Format$(CCur
(Number), "0.00"))
```

where RoundNo is the result and Number is the number or calculation to be rounded. Do you know of a better way of doing this?"

Paul le Gassick

The answer is that I don't. Anyone else? (See Figs 1-5.)

PCW Contacts

Mark Whitehorn welcomes readers' correspondence and ideas for the Databases column. He's on **m.whitehorn@dundee.ac.uk**

Rich pickings

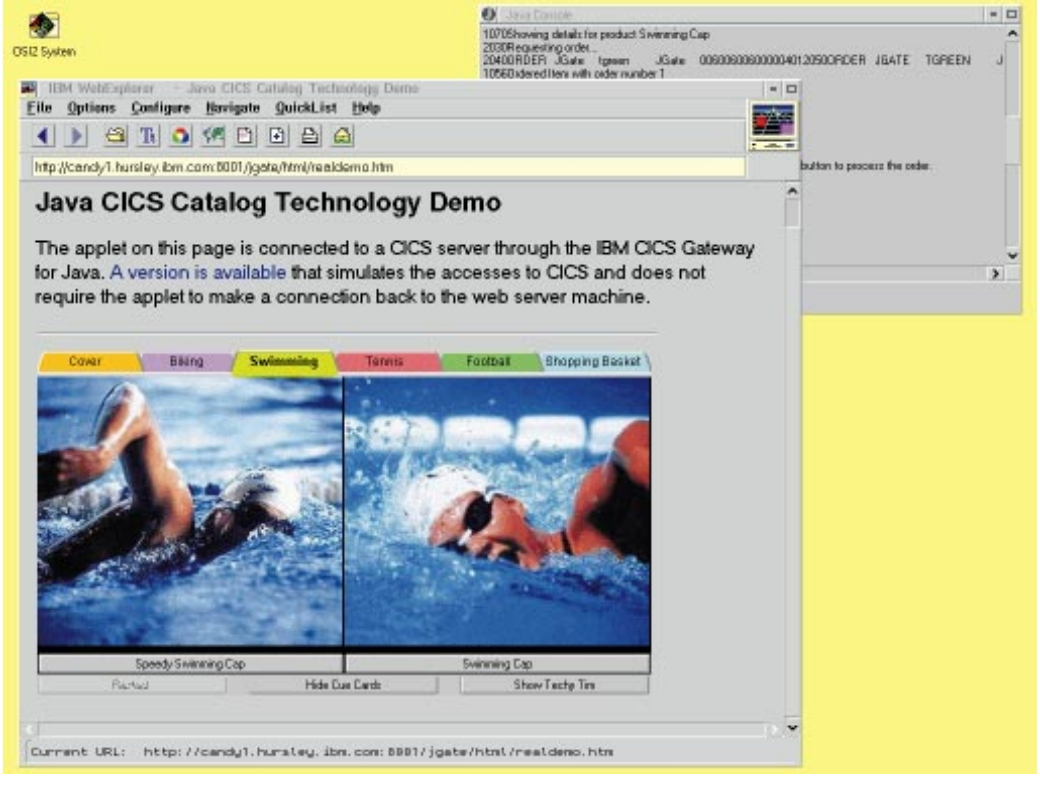
The internet has transformed the OS/2 online experience from being basically quite poor, to rewarding and full of potential. Terence Green applauds the way forward.

A while back I promised to report on my experiences with online services and how OS/2-friendly they are. Basically, they aren't very; but thanks to the internet, the online experience is turning out to be far richer and more difficult to summarise. And it moves rather quickly: within a year, Java has become very important and OS/2 is well placed. I'm running a Java-enabled OS/2 browser now, and Merlin will ship with Java support as part of the operating system. You will be able to drag a Java applet onto the desktop and run it anytime.

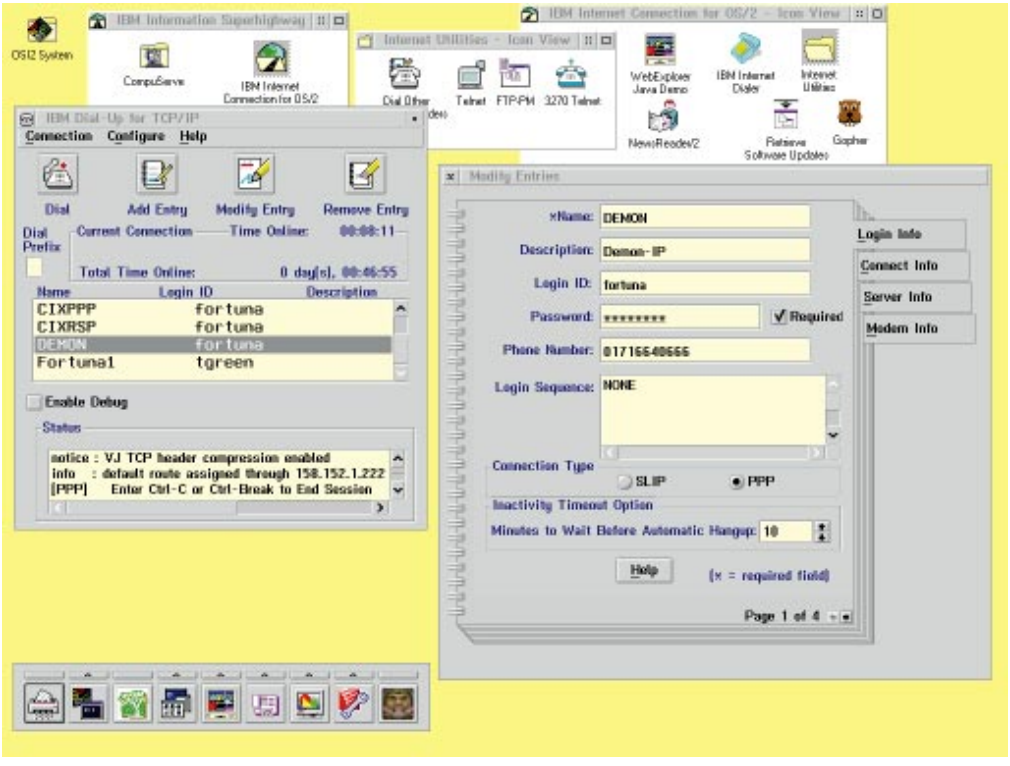
It puts Warp users in a good position. Warp was the first general-purpose desktop OS to include internet access software. Merlin will be the first general-purpose desktop OS to run Java, a platform-neutral way of creating internet applications which has garnered the support of every major player in the business. And it's nice to hear that an OS/2 Netscape is in prospect, although the Java-enabled Web Explorer (below) is pretty neat for a product that started with a couple of IBM employees and was bundled into Warp back in 1994.

All my fiddling with early beta code for Merlin and Java means you'll have to wait another month for a full internet round-up including a selection of news-readers, mailers and access tools, but I'll cover basic CIX and Demon access here. Remember, if you're an international traveller, you'll want an internet service provider with worldwide local access points such as CompuServe, AOL, MSN or the IBM Global Network. Demon may expand into Europe, but CIX looks firmly settled in the UK.

This month's CD grab bag includes some demos, namely Colorworks, UniMaint, FileStar/2 and some fixes (ATAPI CD-ROMs, Adobe Type Manager 3.x for Windows, PPP dialler, an interface monitor, small fonts for S3 video) and the latest Web Explorer 1.1D official release, plus information on setting up with an Internet Service Provider. Look (or rather search for it, as the CD production people like to hide the OS/2 stuff lest its presence upsets Windows users) on the covermounted CD.



A live demonstration of a Java-enabled Web Explorer accessing a CICS order processing system at IBM's Hursley Labs where Java development is centred



Setting up IBM's catchily-named Dial Other Internet Provider utility. It's important to get every detail correct in order to avoid connection errors

To set up the DOIP dialler, choose to add an entry and fill in the details on all four pages. Select PPP for Connection Type on page one; enter Login ID (your CIX-IP login name) and Password on page one of the dialler notebook. Enter the IP address of your host for CIX or Demon, and the nameserver IP address on page two. Fill in the modem details on page four.

For CIX, type the following script into the Login Sequence entry box on page one, save it and you're in business.

```
\r name:
[LOGINID]
word:
[PASSWORD]
ster>
ppp\sxxx.xxx.xxx.xxx\r
```

Replace "xxx.xxx.xxx.xxx" with your CIX-IP address. To use the Internet dialler with Demon Internet, enter details as above, leaving the Login Sequence field at its default "NONE". Demon's login procedure is a straightforward PPP login. The Warp dialler automatically passes the Login ID and Password fields to Demon.

Java jive

Java is only a year old, yet it has taken the industry by storm. The reason is, it promises platform-neutral network applications that will run anywhere. A Java applet only needs to be written once and the binary code will run on any platform with any Java-supporting operating system or web browser.

The code is still a little slow, and it's hard to find applications that do something other than bouncing heads and spinning frogs in blenders. But this is changing. Sun will deliver Java 1.1 this autumn, and together with Just in Time (JIT) compilers the speed of execution will increase. JIT compilers change the Java bytecodes into native processor instructions on the fly. A further optimisation phase, yet to be included in the JIT compilers, will also drive performance.

However, the really interesting stuff is still being worked out. I referred to Arabica in a previous column, suggesting that it was Java in an OpenDoc container. I was wrong. Arabica is the generic name for IBM's approach to Java Beans. Just as Java is a platform-neutral binary format for programs, so Java Beans is a platform-neutral component model for programs that will run anywhere.

Java Beans can be plugged into other component architectures such as ActiveX and OpenDoc or the new component model with a funny name that IBM's website says is super-secret stuff. Java Beans components will retain the ability to run on any platform, in contrast to the OpenDoc or ActiveX model where components must be compiled for specific platforms although they can interoperate.

Why is this interesting, and why is it so important to have platform-neutral binaries? Because users can freely choose their desktop platforms. IT departments spend most of their time reconciling the conflicting needs of multiple different desktop platforms with multiple versions of the same or similar programs. Imagine a Java applet sitting on a server, an internet server or a corporate server on a private network. Anyone can run it, execute it directly with a Java-enabled OS such as Merlin, call it from a Java-enabled web browser from the LAN, or dial in with a browser or LAN connection. Compile that application, for example in OpenDoc or ActiveX, and you need separate binaries for every operating system. In specific cases this is desirable, for power-user applications, but there's lots of real work that can be done with Java.

The screenshot of the IBM Java Gateway for CICS (above) shows a transaction processing system being accessed via a web browser. I took the screenshot while using the Java-enabled Web Explorer Demo but it worked with Windows NT and Internet Explorer, and with NetScape. I've seen it demo'd elsewhere on Windows 95, and IBM also has a Java-enabled Windows 3.1 in the pipeline. And there's Java on Macs and Unix and pretty soon on televisions too! Ordering sports gear, checking stock, data on the mainframe, on mid-range, on the web, on networks — all freely accessible with Java binary applications that only need to be written once to run everywhere.

The demo CICS ordering system based in Hursley may still be at http://www.hursley.ibm.com/cics when this appears in print. By the end of 1996 you can expect to see real applications that run everywhere and do really useful stuff.

PCW Contacts

Terence Green can be contacted either by post c/o *PCW* or by email at **tgreen@cix.compulink.co.uk**

Going back to your **roots**

Mike Mudge presents a square-root algorithm suitable for newcomers to this column, and rational approximations to square roots of integers should crank your brains into gear.

This month's theme is based upon an article by P. Shiu in *Mathematical Spectrum*, vol 4, no. 1, 1971/72, pp26.30.

To approximate to the square root of N, i.e. $N^{1/2}$, where N is a given square-free integer, first seek an integer solution m_0,n_0 of the equation $n(n+1) = Nm_2$. Then observe that this equation is also satisfied by the sequence:

$m_1 = 2m_0(2n_0 + 1),\ n_1 = 4n_0(n_0 + 1)$
$m_2 = 2m_1(2n_1 + 1),\ n_2 = 4n_1(n_1 + 1).....$
$m_{k+1} = 2m_k(2n_k + 1);\ n_{k+1} = 4n_k(n_k + 1)$

While $n^{1/2}$ is approximated to (from above) by:

$r_k = (2n_k + 1)/(2m_k)$

e.g. If N = 2 we may choose $m_0 = n_0 = 1$ when the above recurrence relations yield:

$m_1 = 6,\ n_1 = 8;\ m_2 = 204,\ n_2 = 288;$
$m_3 = 235416,\ n_3 = 332928;\ m_4 = 313506783024,\ n_4 = 443365544448;$

These numbers yield an n_4 which differs from $2^{1/2}$ by less than 10^{-24}. We have an approximation to square root of two correct to 24 decimal places!

PROBLEM ROOTS. Implement the Shiu Algorithm to initially find an m_0,n_0 pair for a given N, followed by the sequence of fractions (r_k) which approximate to $N_{1/2}$.

PROBLEM ROOTS*. Attempt to generalise this process to cuberoots and beyond, comparing its computational efficiency with other, more commonly used algorithms.

An 'almost incomputable' function

The recently-published text by Arnold R. Krommer and Christoph W. Ueberhuber, "Numerical Integration on Advanced Computer Systems", Lecture Notes in Computer Science 848, Springer-Verlag 1994, has a 268-item bibliography and a commensurate body of text, an altogether outstanding publication. On page 186, readers are introduced to the function

$f(x) = 3x^2 + (PI)^{-4}\log((PI - x)^2) + 1$

which has a pole at x = PI, by which we mean that its value is unbounded below (infinitely large and negative) at x = PI.

Since clearly the function is positive over very large ranges of x, it must have two zeros (at least) one on either side of the pole. However, if it is sampled at ALL MACHINE NUMBERS differing by 2^{-54} (approximately 5.6×10^{-17}) and corresponding to Double Precision IEEE Arithmetic, the pole cannot be detected and indeed no negative values are generated.

PROBLEM FUNCTION. Devise a means of exhibiting either graphically or numerically the true behaviour of this function. Such revelations may come from a sophisticated programming technique, or by the use of some algebraic transformation?

PROBLEM FUNCTION*. Indicate some other functions which exhibit this type of behaviour. Do any of them have a practical application?

● Any investigations of the above problems may be sent to Mike Mudge, 22 Gors Fach, Pwll-Trap, St. Clears, Carmarthenshire SA33 4AQ, tel 01994 231121, to arrive by 1st February 1997. All material received will be judged using suitable subjective criteria and a prize will be awarded by Mike Mudge to the "best" entry arriving by the closing date. Each contribution should contain brief descriptions of the hardware and coding used, together with run times and a summary of the results obtained. (SAE for return entries, please.)

Report on Numbers Count -155- 'Pounding the beat', *PCW* March 1996

All aspects of this column generated interesting responses. The "Full Houses" or "Prime Decades" upto 100000 numbering 40 (less the two inadmissable 11,7,5,3 and 13,11,7,5) these consist of the 37 regular ones and the anomalous 2,3,5,7. Alan Cox obtained these with UBASIC and its NXTPRM(x) function (can any reader tell us how this function works?) in 48 seconds on a "slow 8086", while Hugh Spence used an AMD 585 running at 133MHz in Modula-2 ("the last Topspeed incarnation") to reproduce the results in 9.5 seconds.

Problem GS produced responses, including one from Tim Thorp who refers to Donald Knuth's *The Art of Programming* where the base three (being the integer nearest to e) is "in some sense" optimal for numerical operations.

This month's winner is David Price of 13 The Hall Close, Dunchurch, Rugby, Warwickshire CV22 6NP: his representation of numbers in various bases extended to complex bases and involved Fortran in double precision on a 486 PC. Altogether a commendable mixture of algebra/calculator arithmetic and programming.

•PCW Contributions Welcome

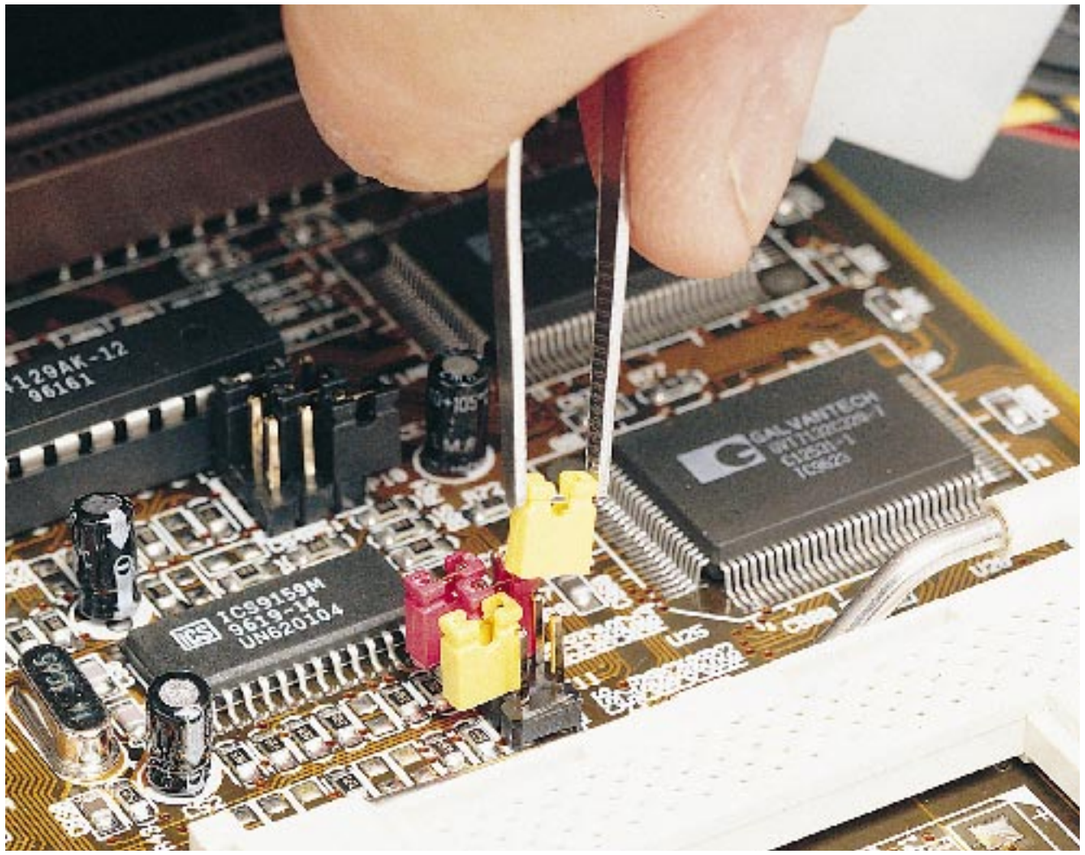
Mike Mudge welcomes correspondence from readers on any subject within the areas of number theory and computational mathematics, together with suggested subject areas and/or specific problems for future Numbers Count articles.

Out with the **old**

Fed up with watching paint dry while your PC chugs away? Why not upgrade the motherboard — Roger Gann shows you how.

Over the past few months I've looked at upgrading your PC in various ways: adding more memory, fitting an overdrive processor, adding an EIDE hard disk, and so on. While all these upgrades will improve your PC's performance, the overall gains garnered from these upgrades aren't particularly breathtaking. This is because all you're doing is moving a performance bottleneck elsewhere in the PC to some other, relatively old, component.

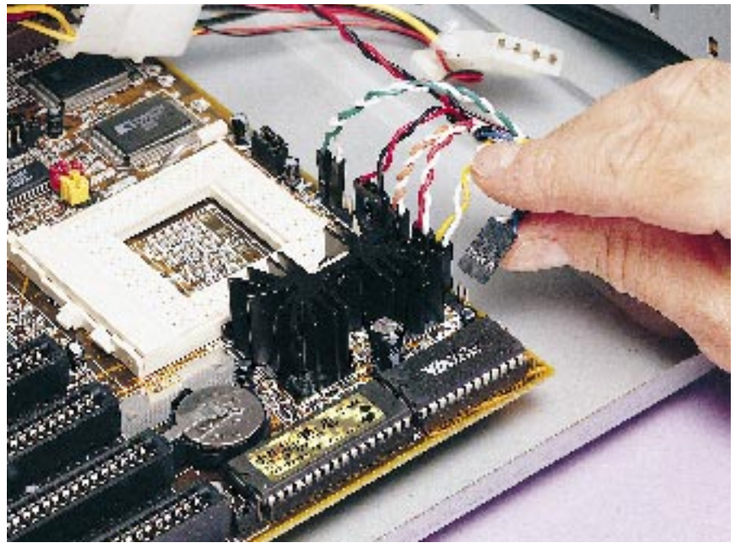
A more fundamental upgrade is required if you are looking for tangible performance gains: I'm talking about replacing the motherboard in your PC with a more powerful one. Not only would such a move allow you to use a more powerful processor, but you'd benefit from other advances, too, such as pipeline burst mode cache or the latest RAM technologies, such as EDO or Synchronous DRAM. You would also benefit from the latest PCI bus technology and lifesavers such as plug and play, especially if you're a Windows 95 user.



Coloured jumpers: we're in luck as this motherboard uses coloured jumper sleeves to differentiate the various types of jumper, e.g. clock speed and processor type. Make sure the new motherboard is correctly jumpered for the type and speed of processor you're using

Sometimes you have no choice but to swap motherboards. The fastest Pentium overdrive for the 486 architecture stops at 83MHz, yet Pentiums are now running at 200MHz, and if you want more performance you'll have to upgrade your motherboard. But this is not as expensive as you might think. A DX4/100 overdrive will cost £120, while a 100MHz Pentium motherboard will cost only £70 more. Don't lose sight of the potential extra costs imposed by the new motherboard, such as new memory if you've got old 30-pin SIMMs, or a new PCI graphics card if all you've got is VL-Bus.

A motherboard upgrade sounds complex, but don't worry. It is relatively hassle-free and your old PC gets a power boost without the need to duplicate or replace files, connections or peripherals. Complex reconfiguring is not necessary and, outwardly, your PC remains as its old familiar self.



Multicoloured leads: pay close attention to the multicoloured leads and plugs before you unplug them from the old motherboard — it'll help you to identify each cable. If you're lucky, the plugs will be labelled

The downside

Although it is physically possible to upgrade just about any PC's motherboard, you should pause before taking the plunge. Swapping motherboards is rather more involved than fitting an expansion card and not something for the technically timid. Choosing a motherboard can be a big problem because, apart from Intel with its Endeavour and Atlantis main boards, most are brand-less designs from companies of which you may never have heard.

Another problem is that, thanks to the pace of change, a particular model of motherboard might only be in production for a few weeks before being replaced. Remember, only four months separated the launch of the 166MHz and 200MHz Pentium processors, so the odds are that when you see a motherboard listed in an advertisement, its make and model won't be listed. Motherboards are effectively

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generic products, rather like potatoes. As for technical support, well — you are almost always on your own. Then there is the problem of overdoing it. There is no point in performing such an upgrade on a 386 because the rest of its hardware, like its graphics card and its hard disk, will be so slow as to be inadequate. The "weakest link in the chain" analogy applies here.

Another significant problem is the form factor of the motherboard: that is, its shape and size. While most clone manufacturers use the so-called "Baby AT"-sized motherboards which are readily interchangeable, most big name manufacturers tend to use their own proprietary motherboard designs, which aren't. Not only are they an odd, non-standard shape, but they may also be highly-integrated designs incorporating all I/O functions directly on the motherboard and not on expansion cards. You expect this from the likes of IBM and Compaq but you'll find that Amstrad, Viglen and Elonex also fall into this category.

The only way to upgrade the motherboard in these makes of machine is via the manufacturer, which makes them difficult to get hold of and pricey. So before jumping in at the deep end, make sure your new board will fit okay.

Step by step

Step 1 — Preliminaries

■ Before doing anything, it's a good idea to print out your existing CMOS settings. You can do this by taking a screendump of each screenful of settings. Ensure your printer is on and connected to the PC, and press the PrtScr key.

The reason for doing this is to prevent potential problems later on when you install your new motherboard and you can't remember the previous settings. Don't forget, we're only changing the motherboard — all the other components are staying put.

Probably the most important settings are those that set the hard disk's geometry, because if you get these wrong, the PC won't reboot at the completion of the upgrade.

You could argue that this is unnecessary as most modern BIOSes are capable of auto-configuring the hard disk's geometry, so what's the point? Problems can arise if you previously used drive translation, say to reduce the number of cylinders to less than 1,024. When auto-configuration kicks in, it will only use the drive's default geometry, not the translated one. The drive will not then boot or be recognised. But if you have the original values, it's easy to key them in.

■ Take a moment to examine your new motherboard and read through its undoubtedly sparse manual. Check if there's anything important of which you should be aware. Most motherboard manuals are invariably techie, but you should try to identify the positions of important jumpers.

■ If you're fitting a new processor as well, install it and move all the jumpers now, while you've got perfect access to every corner of the board. The same applies if you're fitting new RAM.

■ Finally, assemble your toolkit. You'll need a crosshead screwdriver, an electrician's screwdriver and maybe a pair of fine needle-nose pliers.

Step 2 — Dismantle the case

■ Switch off the PC and unplug everything attached to the system unit: typically the keyboard and screen. All micro-electronics are very sensitive to static, and the kind of static discharge that gives you a very mild electric shock can be fatal to micro-electronics, so take the precaution of earthing yourself by touching some metal plumbing before handling the new motherboard. Better still, invest in an earthing wrist-strap.

■ Remove the casing lid by undoing the screws at the back.

Step 3 — Remove the expansion cards

■ Our next task is to remove all the expansion cards, so undo the screw holding each card's blanking plate and carefully extract each card, putting it somewhere safe.

I guess that most people will need to remove just three cards: a graphics accelerator, a sound card and a multi I/O card which will have the serial ports, parallel ports and the hard disk/floppy disk controller. This will have a couple of grey ribbon cables plugged into it, so unplug

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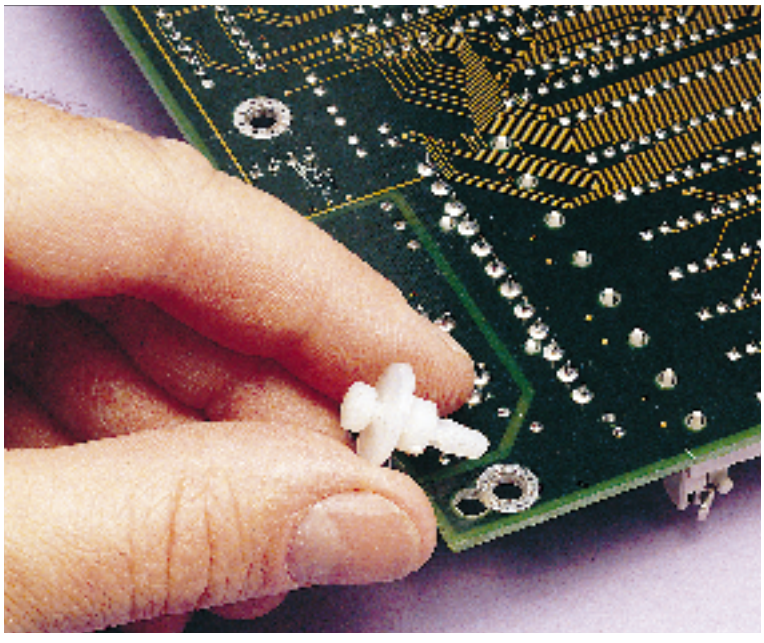
them, taking careful note of which side of the ribbon has the coloured edge.

■ Tuck the now loose cables away behind the disk drives and don't forget to unplug the hard disk's activity LED cable. More modern motherboards have done away with separate I/O cards and instead integrate the I/O ports on the motherboard, so in this case unplug all the cables.

If you have a sound card, unplug the thin CD audio cable before removing the card. With all the cards out, there's no need to remove anything else. The hard and floppy disk drives can stay put. Some compact casing designs use drive cages that hang out over the motherboard and make installing/removing a motherboard awkward, so remove these as well.



Plastic standoffs: be sure to make a careful note of which holes the standoffs occupied in the old motherboard before transferring them to the new one. You'll need a pair of pliers to remove them

Step 4 — Remove the cables

■ The next step is to remove the rest of the cables from the motherboard. Located somewhere near the keyboard socket at the rear you should see a pair of large, white or cream, power leads perhaps labelled P8 and P9. These can be quite reluctant to unplug, so you may have to use measured force to get them to shift.

■ There will also be a group of thin multi-coloured cables plugged in at the front of the motherboard. These are for the power and turbo LEDs, the keylock and reset button. Occasionally, the little black plugs will be labelled. If they're not, it makes sense to identify them now while they're still connected. There's often a name printed on the motherboard to identify that connector.

Step 5 — Remove the old motherboard

■ The motherboard will probably be held by a couple of bolts. Locate them, undo them and put them in a safe place.

■ The motherboard will now be resting on several white plastic stand-offs, or spacers. These fit into tapered slots at the base of the chassis. You should now be able to slide the old motherboard out to the left but you may have to wiggle it about a bit first.

■ Once the old motherboard is out, use the pliers to extract the stand-offs and re-fit them in the corresponding holes in the new motherboard. There are normally several spare holes in the motherboard so don't fit spacers to all, as there won't necessarily be corresponding slots in the system case.

■ If you're able to reuse any SIMM modules, now is the time to remove them and transfer them to the new board.

Step 6 — Install the new motherboard

■ Give the new motherboard a once-over to make sure you've correctly set its jumpers.

■ Slide the new motherboard into position at the base of the chassis, so that the stand-offs engage in the right slots in the casing. The position of the keyboard socket and the hole in the casing for it will help you to locate the motherboard correctly.

■ Refit the bolts to secure the motherboard in place.

Step 7 — Reconnect the cables

■ Refit the P8 and P9 power cables to the motherboard: the norm is that the black cables on each plug should go together. The most fiddly bit is refitting the little multicoloured cables. Typically, these will be positioned along the front edge of the motherboard and I can guarantee that they won't be in precisely the same position or order as they were on the old motherboard.

■ There will probably be connectors for these cables: keylock, reset, power, turbo LED, switch and speaker. Sometimes they can be grouped together to form two or three plugs. If this is a problem because the motherboard connectors are not arranged like this, it's okay to split the plastic plug into two separate plugs using a sharp knife.

Step 8 — Refit the expansion cards

■ Replace the previously-removed expansion cards, the graphics card, the I/O and hard disk controller.

■ Reattach the hard disk data ribbon and LED cables.

■ Replace the cover, plug in the screen and keyboard, and power up your PC. If something is not right, you'll know it because the BIOS will signal an error.

As the BIOS can't depend on the video working, it will simply emit a series of coded beeps through the speaker. If you haven't fitted the memory properly, or if the video card isn't working, you'll hear a pattern of repeated beeps. Check the motherboard handbook to decode the pattern. In my experience, the most common problem has involved a badly-fitted or defective video card. A badly-fitted SIMM which is not quite seated is another candidate.

Step 9 — Edit the CMOS settings

■ The new motherboard's CMOS settings will effectively be blank, so the first time you boot up you'll typically be invited to enter CMOS setup to key things like the date and time, hard disk details and so on.

■ Try out the hard disk auto-configuration option and, using the notes you made earlier, compare the old settings with the suggested new ones: if they're the same, accept them; if not, edit the values manually. Don't forget to specify your floppy disk settings. Delay tweaking the advanced CMOS settings for another day, save the settings, and reboot. All things being equal, your PC should now boot up as normal.

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Why did the **chicken** cross the road?

To see Talisman, the new 3D hardware architecture from Microsoft. Benjamin Woolley looks at its application in real-time graphics, and gets in a twist about special FX.

I first visited SIGGRAPH, America's annual computer graphics megafest, in 1989 when it was held in Boston. I still have the mousemat to prove it, which features a large red lobster (Boston's unlikely choice of mascot). Even in those days, SIGGRAPH was huge, attracting upwards of 20,000 delegates from all four corners of the globe and the computing industry. It was there that I remember Al Gore, then a humble senator, now vice-president of the USA, opening the event with a live-by-satellite speech in which he talked of information "exploding in leaps and bounds". A wonderfully Moulinexed metaphor it may have been, but it accurately captured SIGGRAPH's transformation into one of the computing world's key events.

It was at SIGGRAPH 89 that people started talking excitedly about this newfangled virtual reality idea, and gazed with amazement and amusement at Jaron Lanier, the then fledgling VR industry's chief guru, doing his strange sort of jam session thing during what was otherwise supposed to be a serious technical conference.

These were the first tinglings of excitement that now seem to electrify SIGGRAPH every year as it becomes ever more firmly established as the venue for unveiling the most exciting ideas and developments in visual entertainment. At this year's conference, held in New Orleans, they came in their tens of thousands to get a peek at next year's movie effects, web content and games. Where Boston was full of bearded programmers and conceptual artists, New Orleans attracted the likes of Jeffrey Katzenberg, co-founder (with Stephen Spielberg and David Geffen) of the new computer-literate Hollywood studio, Dreamworks. It is also where you find a welter of new animation, including a strange little cartoon called "Chicken Crossing".

Finger-lickin' good...

Chicken Crossing was neither produced by DreamWorks nor any other studio. It came from Microsoft, a company that did not even attend Boston yet was out in full force in New Orleans. Although amusing enough as a work of entertainment, Microsoft's first attempt at a cartoon had the primary purpose of showing off "Talisman", a new technology being developed by the company's research division. This is, Microsoft states, "a new 3D graphics and multimedia hardware architecture" and if Chicken Crossing is anything to go by, it's the first sign that decent real-time 3D graphics may at last find their way onto the home PC.

First, let us consider what we mean by real-time graphics. In a 3D game like, say, Myst, or a movie with 3D graphic effects such as Twister (*see later*), the computer-generated images you see take hours, sometimes even days, to produce. So, obviously, they have to be done in advance. As a result, a game like Myst cannot strictly be 3D. Rather, it is a slideshow of 2D images with various puzzles determining the order in which they are seen.

A game like Doom is very different, because as you wander around those interminable tunnels (I am not a fan) the images are more or less generated from scratch as you go. This is necessary if the game is to allow you to roam freely through the artificial world it is trying to recreate, because to pre-render and store each possible scene as witnessed from every possible point of view would require impractical quantities of rendering time and storage capacity. Games like Doom deploy

Fig 1 **A particle system in action**

Fig 2 **Three stills from Chicken Crossing**

a special set of graphics tools (known as APIs) which use a variety of nifty shortcuts and compromises to generate each image as and when it is needed.

Several APIs have been developed for this task, one of the best known of which, Reality Lab, was created by a British company called RenderMorphics. Like so many innovative British high-tech companies, RenderMorphics was snapped up by Microsoft which used Reality Lab as the basis for Direct3D, which itself is a subset of a whole library of APIs designed for multimedia content, called DirectX.

DirectX provides the software layer for the Talisman architecture, and Chicken Crossing was supposed to demonstrate what the two could achieve, in combination. According to Microsoft, a Pentium PC with Talisman hardware (which should only cost two or three hundred dollars) could render and display each of the frames you see in Fig 2 and the 6,997 that made up the rest of the Chicken Crossing animation, in the time it takes for the screen to refresh (in other words, around one 75th of a second). This is an astonishing claim, given the richness of the textures and the number of objects: way beyond anything currently achievable on a Pentium system, even one with hardware acceleration.

In an extremely technical paper presented to SIGGRAPH, Microsoft explained how this impressive trick could be pulled off. Talisman, like any graphics technology, works by making compromises, the most important of which is layering. Most 3D scenes are rendered as true three-dimensional spaces, with the shading of each element of the scene calculated according to its position and orientation with respect to the rendered point of view. Talisman instead associates particular objects in a scene with particular layers, and then decides how much work needs to go into rendering each layer. So, for example, a layer comprising an object disappearing into the distance needs very little render time at all. Indeed, the effect can be reproduced in a 2D rather than 3D scene by scaling down the 2D image of the object as it recedes.

On the face of it, this is a clever solution, although how smart Talisman-based software will be when it comes to deciding how to handle layers, remains to be seen.

Another compromise is one that sounds rather obvious, even low-tech. It is graphics compression. For various technical reasons to do with the way a scene is calculated, compression is difficult to achieve with conventional renderers. With Talisman, the scene is rendered in blocks 32 x 32 pixels in size (the process carries the unglamorous name of chunking), which can be compressed using the same sorts of techniques used by the JPEG graphics format.

Microsoft says it will not be making Talisman boards, but will license the detailed "reference" design to hardware manufacturers. The company claims that because the design of the silicon is relatively simple and because many of the main components will be standard parts, boards should retail for less than $300. If this is the case, then that really should set the cat among the crossing chickens.

Particles

Summer is about blockbusters, and nowadays blockbusters are about showing off the latest computer graphics effects. Some of the most impressive were to be found in Twister, a movie about tornadoes. In my opinion, the computer-generated tornadoes were the most realistic feature of the whole movie (far more realistic than the characters) and I began to wonder about how they might have been produced. With the help, it turned out, of the resources of Industrial Light and Magic, AliasWavefront, several very pricey plug-ins and about 20,000 lines of customised code.

Having returned home, I tried to brew up a tornado for myself. Naturally I failed (it looked like an upturned tree trunk) but I did manage a smoking chimney (Fig 1).

The key to such effects is a set of 3D tools called particle systems. These are not yet to be found in cheaper 3D packages but they should trickle down into future releases. There are a number you can buy as plug-ins for mid-range programs: for Lightwave, for instance, you can buy products like Particle Storm for about £300.

I used a 3D Studio Release 4 plug-in called "Vapor" to produce the smoking chimney. It is an unexceptional effect but, believe me, it was not easy to create. All particle systems make enormous demands on the processor, not least because being effects that develop over time, they have to be calculated for each frame of an animation. This means that until you render the animation, which can take ages, you cannot really judge whether you have correctly captured the dynamics of your smoke trail or twisting tornado.

The key to all particle effects is a special class of objects called "emitters". These emit a series of smaller objects (the particles) that are generated at a particular rate and disperse in a particular direction, in a particular formation, at a particular speed.

The Vapor plug-in comes with a series of presets for producing different types of smoke, from a cigarette trail to a steam locomotive's billowing clouds. The latter was not particularly convincing, so I had to fiddle around with the parameters to achieve the effect seen in Fig 1 (which, I hope you will appreciate, looks a lot better when animated). Each change to the size and intensity of such parameters (the "whorl" and "turbulence") produced rather unpredictable results, so it took a good few goes, and hours of rendering time, to tune the effect. It just goes to show that there is no smoke, and no tornado, without toil.

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Lasting **impressions**

Aargh! Your graphical work-of-art looks no better than a photocopy when printed out. What are you going to do? Consult Gordon Laing, of course.

It would appear that in the wide world of graphics and desktop publishing the two most popular subjects, in terms of requests or feedback to me anyway, are fonts and preparing for output. No, honestly, they really are. If you want to point me in another direction, please feel free! While there's another font feature brewing, this and next month's pages are devoted to the process of getting your hard work onto quality paper. But first, here are this month's news and snippets.

The legendary PaintShop Pro has returned in the 32-bit guise of version 4 for Windows 95 and NT 4, costing £49.95 (plus VAT) from Digital Workshop. Check out my review in this month's *First Impressions*.

Following its announcement in September, Adobe is gearing up to launch new versions of most of its applications. Due before Christmas is Photoshop 4, PageMaker 6.5, ATM Deluxe 4 and the much-hyped Acrobat 3. An up-to-date Illustrator for Windows is not part of the big roll-out, and its future on the PC platform remains a mystery.

Photoshop and PageMaker

Here's a taster of Photoshop and PageMaker, prior to their forthcoming in-depth reviews.

Photoshop 4 for Windows 3.x, 95 and NT, along with Mac and PowerMac, has addressed several key complaints about previous versions, particularly that of speed. Since we haven't yet tested a final copy we cannot verify performance claims, but the new Navigator palette is a big step forward. This displays the entire image with a box representing what you see in the main window. Instead of blindly moving scroll bars on the main window, you can see where you are at a glance in the Navigator palette, quickly relocate to a new region and zoom in or out as desired.

Features like guides and grids are so obvious, it's a surprise they weren't there earlier. Just drag 'em out as you would with any DTP or illustration package and even get elements to snap to location, if desired. Web designers will like the addition of new filters including Portable Network Graphics (PNG), Progressive JPEG and Adobe's own Acrobat Portable Document Format (PDF). Web formats and page design will be covered in forthcoming columns.

With 48 new effects filters, but still only one undo step, many users will find themselves performing actions they may regret. With Photoshop 4, it is now possible to have an effect as a layer in the Layers palette. Simply move it around to affect different layers and switch it on or off as desired. Those interested in automation will be pleased with the new Actions palette which can store sets of editable instructions to perform on a multitude of files.

PageMaker 6.5, for Windows 95 and NT along with Mac and PowerMac, incorporates several innovative features which should help it recapture DTP market share from Quark XPress. Adobe is trying to maintain a common look and feel among its applications, and PageMaker 6.5 now features a Photoshop-style layers palette.

Placing elements on a page and sending them to the front or back is not a new DTP concept, but now you can place a number of page elements on a layer, then rearrange, hide or view them as desired. Adobe pointed out that you could have text in multiple languages on separate layers of a single document, enabling the selection of each as required.

Although remaining heavily committed to paper-based publishing, Adobe has increased the number of web-designing facilities in PageMaker 6.5. These include drag-and-drop hyperlinks from browsers straight onto your pages, automatic conversion of graphics to GIF and JPEG format, automatic reformatting of publications from portrait to landscape orientation, enhanced HTML export plug-in, and even a dedicated hyperlinks palette.

PageMaker is due for release in November, and Photoshop should be available by the time you read this.

The new-look PageMaker 6.5, with XPress-style frames and Photoshop-like layers

Final output

It's easy to fool yourself into believing your graphics or DTP job is complete after the final save. All you need to do is print it out, and surely that's as simple as pulling down the File menu and letting go at the right point. One click later and you've got your output. Right? Of course not. It *is* possible in some cases to successfully output in one go, but many graphics jobs require more thought and a few extra steps.

The trouble is that few of us have access to either the kind of printers capable of high-speed, high-resolution colour output on a variety of materials in a multitude of sizes, or even the facility to trim pages and bind them together in a magazine format with a shiny cover. Shame, really.

There are standalone colour printers which can satisfy the requirements for many jobs, but if you're after very high quality, perhaps in large format or at a high volume, you're most likely to have to employ outside help and this is where the problems arise.

The bureau, repro house, image setters, outside help or whatever you want to call them, are essentially just a bunch of people who bought a nice, expensive printer and scanner, have expertise on how to use them, and are willing to sell you both by the minute. Sounds great. All you have to do is design your work, get it to them, and they'll print it on their gear. Next thing you know, your work arrives with an invoice and, hopefully, no mistakes.

While invoice mistakes are pretty bad, I'm actually referring to mistakes with your work. But what could possibly go wrong? The main thing to remember is that their machine might not have the same features that you take for granted on yours. They must have the same fonts you've used, for one thing, or substitution will occur. They must open your document using the same application with which it was created: it's no good giving them a PageMaker document if they can only read Quark XPress, however good their conversion filters may be. PC-to-Macintosh conversions and vice versa are even more problematic, and pictures can be a nightmare. It's all very well leaving gaps for photos, but if they don't know what goes where and which way round, you could be in trouble.

Getting your work to them can be fraught with difficulties. There are few graphics files which fit on a floppy disk. With tens or even hundreds of megabytes, you're in the realm of removable drives, such as the SyQuests and Iomegas of this world. Just make sure the bureau has something that can read your disks. One-gigabyte Jaz drives may be cool, but few repro houses are equipped with anything other than the ubiquitous 44Mb 5.25in SyQuest cartridge. Even the later but still dated 88Mb and 200Mb carts are rare.

Perhaps you're in a rush, so the post is no good. Overnight won't do. If a courier is too slow, you could be looking at sending files over the phone. Once again, it's no good having a speedy modem or ISDN line if they don't have one at the other end. The transportation of large files will be covered in a future column, so here we'll concentrate on preparing colour documents for output on a commercial printing press, a process known as pre-press.

A commercial printing press is only capable of printing one colour at a time, each laid down in a separate pass. The fewer the passes, the quicker and, consequently, cheaper the job will be. If your document consists only of black ink, the machine operator has only to fill it with black ink and run your paper once through the press. Perhaps you want black for your text, but a nice bright red logo too? In this case, the printing press is loaded with black ink and the paper is passed through, then the press is reloaded with red ink for a second pass.

On the spot

Pre-mixed inks such as these are known as spot colours and are often chosen from a book in a similar manner to choosing paint at a DIY store. Consistency and accuracy is the beauty of choosing colours in this way. If everyone owns a copy of the book and someone talks about using the red on page 36, everybody knows exactly what colour is being described. The most famous spot colour collections include Pantone, Focoltone and Truematch, which may also feature examples of their inks on a variety of paper types.

So far so good; but what about a full-colour photograph with countless shades? One ink at a time is not going to be suitable for this kind of continuous tone image. In fact, printing more than four to six inks per page becomes prohibitively expensive.

It is possible to fool the eye into perceiving full colour by mixing varying amounts of the key primaries. Monitors and television sets transmit red, green and blue light which mix to create any colour required. All of them together make white but if none are present you get black. This is

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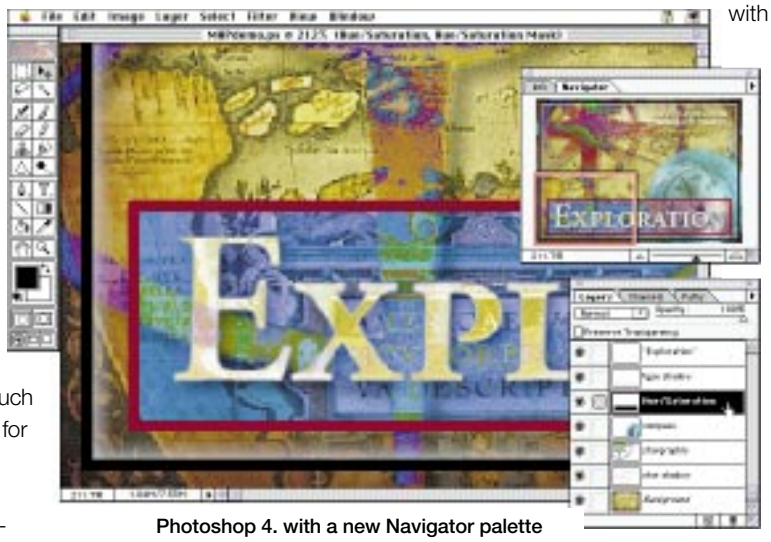
known as the additive RGB model.

However, on a printed page the inks absorb incident light, the remainder of which is reflected to our eyes. This absorption, or subtraction, of light by the inks results in a colour model based on cyan, magenta and yellow primaries. Magenta ink absorbs, or subtracts, green from white light, leaving red and blue light which mix to make magenta light. We therefore perceive magenta ink as magenta colour. Mixing cyan, magenta and yellow ink means all light is absorbed, resulting in the perception of black. More obviously, no ink at all results in white.

This is all hunky-dory in theory, but physically mixing cyan, magenta and yellow ink on paper results in muddy brown. Since black is such an essential colour, particularly for type, most printing processes include a dedicated black-ink pass, hence, the common four-colour subtractive CMYK process, K representing black.



Photoshop 4. with a new Navigator palette and effects applied as layers

Commercial printing presses, like most printers, are incapable of printing shades of an ink. It either places a dot of ink, or it doesn't. Consequently, shades are created by printing dots of different sizes, a process known as halftoning. When viewed from a distance, groups of big dots are perceived as dark, while groups of small dots are perceived as light. Look closely at a newspaper photo and you'll immediately see the differently-sized dots working in groups to give the impression of shades.

Full-colour CMYK printing uses exactly the same trick but places the dots at four different angles to ensure they don't overlap. The resulting rosette (as it is known) can be seen on any billboard poster or, using a magnifying glass, viewed on a magazine page. When you see a solid colour with no rosette pattern, you've found an example of a spot colour which in full-colour printing would be an expensive fifth pass. Most magazines can afford to use a spot colour on their covers, usually for the logo which must stand out.

Along with looking good, spot colours can also be used to provide colours that the CMYK model simply cannot create, such as those which fall out of the possible range, or specialist ones like gold, silver or laminate.

It is possible to print shades of spot colours. These are known as tints, and are described as a percentage of the original. Tints are also created using the halftone process. Once you know what you're looking for, you'll easily recognise which colours have been used, especially on food and drinks packaging.

The printing press needs to know which inks to put where. In practice, it is supplied with a separate plate for each ink, resulting in, say, five plates to describe cyan, magenta, yellow, black and an additional spot colour. We don't have to worry about plate-making, only that these component colours must be separated from the original full-colour image and from each other.

Fortunately, colour separations can easily be made by most decent graphics and DTP applications. Have a closer look at the options in your printer dialogue box and you'll commonly find the facility to separate colours. The application and printer driver then outputs sheets dedicated to each ink used: one for cyan, another for magenta and so on. These sheets are subsequently made into the plates which drive the printing press. Since each sheet is clearly labelled as to which ink it will eventually represent, there's no need for it to be made in anything other than black and white. Even if you're not going to use a printing press, it's a valuable educational exercise to take a full-colour document and have your application separate it, to illustrate the theory.

The resolution of an image represented by halftones is down to how many of the different-sized dots you can place on the page. Most printers are not only incapable of printing shades, but are also unable to print different-sized dots. Consequently, each halftone dot is made up of many printer dots. The more dots your printer has to play with, the greater the number and variety of halftone dots it can create.

Magazines such as *PCW* print 133 halftone dots per inch (known as lines per inch, or lpi) and require 256 shades of grey. This means 256 possible sizes for the halftone dots. It is achieved with a 16 x 16 grid of printer dots and turning various amounts of them on or off. To make the separations we therefore need to use a printer that is capable of printing 16 dots, 133 times per inch. That's over 2,000dpi, which is why most repro houses, with their expensive printers, make the separations themselves. Of course, if you've got a 1,200dpi laser and require neither as many shades of grey nor lpi, you could save money and make your own separations. Remember, you will be charged for the amount of time it takes to make the separations, so if your pages are complex and full of big images, they will be pricey. Repro houses use high-resolution printers (image setters) which output on transparent film, because most paper has difficulty resolving such small dots and film is easier to make plates with.

I hope that's cleared up a few uncertainties and got you thinking about using the facilities of a repro house. Next month, I'll talk about the unfortunate fact that CMYK inks can only print a limited range of colours and, worse still, are incapable of reproducing many of the colours you see on-screen. I'll go over colour management systems that ensure you don't get any nasty surprises, as well as the truths about expensive repro house scanning, including the times when the job can be done equally well for nothing, using your own desktop scanner.

PCW Contacts

Any repro tips and tricks? Please get in touch with me at the usual VNU Broadwick Street address, or electronically as
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Digital Workshop 01295 258335
Fontworks 0171 490 5390

Pro-**creation**

Corel has given birth to its latest package, Click & Create. Panicos Georghiades and Gabriel Jacobs take a peek.

How many multimedia authoring packages can you name? Five? Ten? Twenty? You may be surprised to learn that there are more than 50 for the various platforms but they are not all called authoring packages. Some call themselves presentation packages, while others are full-blown programming languages. A newly-released package from Corel, Click & Create, joins this large and growing group.

Click & Create is sold as a powerful multimedia authoring tool, at a suggested price of £495 (not cheap by any means). Despite being targeted more at developers than home users Click & Create is not, in our opinion, as powerful as Director or Toolbook although we recognise that much here depends on your particular needs. Anyway, the package does have the Corel badge and offers a number of interesting facilities and resources.

You can use it to develop CD-ROM titles and corporate presentations, although it's wildly overpriced if all you want to use it for is presentations. It can also be used to create screensavers and (very successfully) games.

As for that price tag, Corel is offering a special price of £199 if you want to change from your current authoring system (this is what's generally known in the software business as a "competitive upgrade").

Click & Create works under Windows 3.x and 95/NT. It comes in both 16-bit and 32-bit versions and includes support for DirectX and WinG. A Mac runtime player has been scheduled for release as a free add-on and should be available by the time you read this.

The package includes many features and facilities. There are button, animation, picture and morphing editors. There's ODBC (Open DataBase Connectivity) support and specialised game-editing tools. Applications can be saved as EXE files (or as screensaver SCR files) and you can distribute your applications free-of-charge, although you need to include the product's logo on your packaging.

Click & Create: storybook, frame and event editors

Click & Create can be used to author multimedia, games and screensavers

The two modes supported are frame mode for slides in a presentation or pages in a book, and timeline mode, as in a movie where events happen at a specific time. There are editors for these, as well as a storyboard and event editor. This latter is really the powerhouse of the package. You build up events and when they occur you can trigger actions: play video, CD audio and so on. By using the events editor and menus and dialogue boxes, the program does away with the need for a programming language.

The support for media is extensive and equivalent to that found in any package at the top of the range. If you don't have enough of your own media there's Liberia, consisting of repackaged bits from the clipart that comes with Corel Draw. It's very large and probably better than that offered by any other multimedia package available. There's an extra CD-ROM with 210 fonts, 1,100 images, 250 video/animation files, 1,400 sound effects, 200 transitions and more. The MIDI files were done by our friend Ian Waugh and they're very good. Although 30-days' free technical support is less than you get with other packages, you do not have to pay for the telephone call because it's on a freefone line.

A multimedia music title, compiled using Click & Create

Only time will tell whether or not this product can make a significant dent in the large market shares currently held by Director, Toolbook and their ilk. There's bound to be a shake-out soon — even the potential of the multimedia authoring tool market isn't infinite. We wouldn't dare hazard a guess at who will be the eventual the winners.

You can find more details about Click & Create on the internet at http://www.corel.com/click&create

Going Dutch or going Greek?

Q. "*I live in the Netherlands and bought a six-speed Vertos CD-ROM drive locally. Although it has now broken, it's still under warranty. But I have a big problem because the dealer has gone bankrupt. I've searched (in the Netherlands) for Vertos but it doesn't seem to exist.*

Via the internet I have managed to track down Vertos's home page in Greece and have mailed the company several times, so far with no result. Really, when you buy something in good faith and want to invoke the warranty you should be able to find the company responsible.

I've read in your magazine that Seagate and Sony will repair equipment if a dealer isn't able to. Shouldn't this be standard procedure for all products?"

Guido Schonkeren
<csg807@wing.rug.nl>

A. We publish your letter because, indirectly, it raises two important issues relating to the current state of multimedia hardware.

The first is that the market forces which cause dealers to go bust are, in the end, very much in favour of the consumer. For some time now we have seen falling prices as competition intensifies. If multimedia is to reach its true potential, this competition must continue and many dealers will go bust in the process (it's a fact of life) but it also means that the survivors will be forced to offer less in the way of after-sales service and that is very worrying.

The second issue is that because prices are falling so consistently and so rapidly, we're almost moving into throw-away multimedia hardware. So it would hardly have been worth sending your CD-ROM drive abroad for repair or replacement. Here in the UK, you can now obtain drives from around £35. You should take into account the fact that when you send equipment away for repair, you will

p300 ➢

be without it for perhaps several weeks. It gets close to the point where you might well consider throwing it away and buying new.

In your particular situation, however, you haven't extracted the right information from the net: Vertos isn't a Greek company; the Greeks haven't really manufactured anything since the Parthenon!

Vertos CD-ROM drives are made by Elitegroup Computer Systems in Taiwan. We have no Netherlands address but in the UK they're at Unit 10, Victory Business Centre, Worton Road, Isleworth TW7 6DB (telephone +44 181 847 3332). If you contact the company, giving the serial number of your drive, it should be able to tell you where to get it repaired or replaced.

Perhaps it's about time we had a European Consumer Protection body?

Making Movies

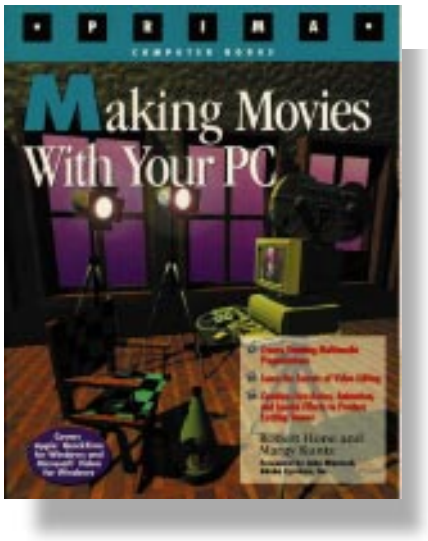
Q. "*I am keen to try video editing on my PC: nothing professional, just VHS film of my family growing up, our holidays and so on. I want to transfer the video from my camcorder to my PC, edit it, inserting titles and transition effects and then dump it onto VHS tape as a finished product.*

I have only seen one advertisement for a complete package, the FAST Electronics F60, which includes hardware and software. However, I am reluctant to commit myself before knowing firstly, whether there are other ready-made solutions and secondly, whether I couldn't construct a purpose-built set-up using a multimedia card and separate software. Many of the multimedia cards I have seen advertised seem to support video capture but not transfer to tape. Any suggestions?"

David Challes
<101713.2007@compuserve.com>

A. We receive many queries on this subject. Yes, you're right: you do need to get a card that supports video output as well as input. But the F60 is not your only option.

Miro DC1, DC20, Reveal VE500P and the new Diamond Crunch It 2000 (as well as others) have video output and are bundled with video-editing software (mostly Adobe Premiere LE or Ulead Media Studio). Some of these cards start at just over £350. There's not really a lot of difference between them and most use the same types of chip. The Reveal VE500P (also named Video Artist), offers a complete package including a book, called *Making Movies with your PC* (ISBN 1-55958-389-4).



However, it's important to take a number of other things into consideration. You need a good hard disk with lots of space and a high and constant transfer rate, especially since you'll be playing back to record the result to video. A transfer rate of over 2Mb/sec (actual figures, not manufacturer's specifications, so take care) is required for a good recording with no deterioration. For VHS quality you can capture at 352 x 288 pixels at 25fps compressed at 4:1.

For this level of performance, an audio-visual drive would be preferable. It gives smoother capture and playback. Two Gigabyte drives can now be had for just under £400. (*See next month's column for more on audio-visual hard disks*).

If you have a machine that has a PCI motherboard, you will achieve better results (i.e. you'll capture more data per second) with a PCI capture card, as opposed to an ISA card.

Fungus Illuminatus

Q. "*I tried to use the Illuminatus demo on the* PCW *CD-ROM, but it won't run because it wants CTL3D.DLL. Where I can get this?*

Secondly, do you think we might ever see a review of expert systems in PCW*? Perhaps this is too specialised but I would like to produce an illustrated guide to species identification for a group of fungi. It looks as though Illuminatus might be suitable and quite inexpensive. I want to do run-time versions but not allow people to readily copy my information.*

It has been suggested to me that you can do just about everything you need to with a Windows help file (although I'd imagine there's not much security). I am not a programmer. Indeed, my attempts at programming in the past have been most unsuccessful!"

Christopher Walker
<walker@globalnet.co.uk>

A. In answer to the first part of your question, CTL3D.DLL can be found on the *PCW* cover-mounted CD-ROM in the directory which holds the Video for Windows 1.1e files. You can copy it to your Windows\System directory and decompress it using:

```
Expand CTL3D.DL_ CTL3D.DLL
```

Better still, just install Video for Windows which you need to do anyway to run the video files on our CD-ROM.

Expert systems are not our speciality, so we'll pass on your request to our features editor. But with respect to your illustrated guide to fungi, Illuminatus is a simple program to use and doesn't require a distribution licence. It's cheap, and most of your data gets embedded in the application so it's not easy to copy. But do bear in mind that no information is safe once it's in electronic form: however much you encode it, once it's on the screen, all someone has to do is press the Print Screen key and it's copied to the Windows clipboard.

The other point to consider is whether you want a text-search facility and how much data your application will hold. If you're dealing with many hundreds of species, a Windows database program (Access, Paradox, dBase, or Approach) may do the job better and more easily than a multimedia authoring tool. With the coming of multimedia authoring tools, database programs seem to have suffered something of a decline (in these types of applications), which is a pity because very often they're exactly what you need.

We assume, in suggesting this, that you have only text and pictures — no video or sound. We also assume that you'll have no hotwords that link to other topics and no pictures with hotspots that lead to other pictures or text. Authoring tools such as Illuminatus and other multimedia authoring software are built specifically to take account of such things.

PCW Contacts

If you have any queries, or interesting multimedia-related topics to discuss, we'll be pleased to hear from you. You can contact us at:
g.c.jacobs@swansea.ac.uk
or **panicos@dial.pipex.com**

Corel 01703 814142

Crash test dummies

Well, it's one way to test the resilience of your PC — send it hurling out of the boot of your car. Steven Helstrip's Seagate drive survived to play another day. Plus, MIDI matters.

Christmas is coming. I know this because I couldn't get into my house the other week, as about 200 press releases had been deposited through my letter box, stopping me from opening the door. I eventually got in through a small window at the back.

Press releases don't usually make it to the top of my bedtime reading list. About this time of the year they get pretty close, though, mainly because manufacturers actually have something interesting to release in time for Santa's global visit.

You'll be relieved to hear that I'm not going to share every press release with you, just one that I'm sure will be of interest. It came from Turtle Beach — you know, the people who make sound cards, and whose press releases read something like: "Multisound Pinnacle, The Ultimate Pro Level Sound and Music Card". How many times have I heard that? In fact, it actually is, or should I say will be when it's released in October. I've been asking Creative Labs to make this card for the past two years, but it has been pipped at the post.

The Pinnacle is the first affordable card to offer an optional professional SP/DIF digital input and output, 20-bit digital audio processing resulting in a signal-to-noise ratio in excess of 96dB, room on-board for 48Mb of sampling RAM, a pretty hot wavetable synth from Kurtzweil providing 4Mb of high-quality samples, and individual effects for each channel. And that's just the start. It will work alongside the Tahiti to provide four individual audio ins and outs, and provides a WaveTable daughterboard connector for the now mandatory Yamaha DB50XG.

The Pinnacle, which is priced at £489, or £599 with digital I/O, should set new standards for PC sound cards. One thing is certain: it will make hard disk recording on the PC a worthwhile venture.

Remixing is simple and fun with MixMan. Load the CD, hit a few keys on your keyboard, and that old tune will never sound the same again

Having a crashing time

On the subject of D2D, I can now wholeheartedly recommend Seagate drives to anyone thinking of buying a few gigabytes of space for recording audio to. This follows a recent incident I had the misfortune to be involved in. I won't go into the gory details, but my PC, which was in the boot of a Golf GTI, landed 20 yards away from the car minus its cover. On inspection, the hard drive had taken a serious battering and the PCB was on its last legs. I didn't fancy my chances when I finally reassembled the PC but, believe it or not, when I switched it on, I listened joyously to the whirring of the hard disk and nearly had kittens when I read "Starting Windows 95". The monitor survived the crash too, although the keyboard was missing a few keys.

In the mix

Hiding beneath the mountain-sized pile of press releases that came into my possession recently was a CD-ROM from Time + Space, called MixMan. Remarkably, it wasn't a sampling CD, so I gave it a spin.

The idea of MixMan is to take a pre-written piece of music, in this case eight kicking dance tunes, and remix them just by hitting a few keys on the computer's keyboard. Each track can be broken down into key elements, chopped and changed around, and mixed in with other tracks' elements.

This is what interactive music is all about— you can have loads of fun with it. If you come up with a particularly stomping tune, you can run it off to cassette and annoy your neighbours while impressing your mates.

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At £39.95 this is a "must have", considering the many hours of fun you'll have creating professional-sounding music.

Desperately seeking more MIDI

Q. "After reading your excellent article in a recent issue of PCW, I am after information regarding adding additional MIDI ports to my PC. I am using an AWE-32 sound card as my MIDI port at the moment, and I'm using Cubase as my sequencer. The thing is, I desperately need another port. Can I just add a dedicated MIDI card? How much are they?"

andrew@wmedia.demon.co.uk

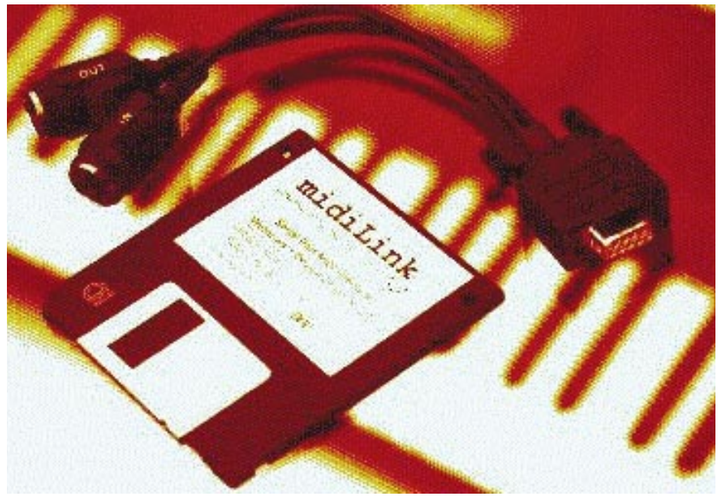
A. MIDI ports are akin to computer memory in that you never seem to have enough of the wretched things. If you need just one additional port, the cheapest solution is to buy an additional sound card. You might not need another FM synth, but it will provide you with another MIDI port and a second audio device, enabling you to play back several tracks of digital audio simultaneously. You can buy a basic SoundBlaster Pro card for around £30, or even cheaper secondhand.

So where's the catch? Unlike Macintosh systems, in a PC it can be tricky to get two sound cards to work together, especially if you have other cards installed. What is certain is that you'll have to configure IRQs and port addresses to ensure the new card doesn't conflict with other devices. This is not impossible to achieve, but it could cause a few headaches. If you have MSD installed on your system, this should give you some idea as to which IRQs and ports are not in use.

Alternatively, you could install a dedicated MIDI interface. These come in many shapes and sizes and provide between one and sixteen additional ports. One card I would heartily recommend is the MIDI Edge 1x4. For a shade under 130 notes you get one MIDI input, with four independent outs providing an extra 64 MIDI channels. A wavetable daughterboard connector lets you add Yamaha's excellent DB50XG card. Software supplied with the MIDI Edge enables two cards to be used simultaneously.

For £69, Et Cetera Distribution has a neat little gadget by the name of MIDI Link, a software-driven MIDI interface which addresses a cable that connects to the serial port. This is ideal for use with notebooks, and could save you a visit to a manicurist once you've broken all your nails trying to change jumper settings on sound cards.

● *See page 307 for contact details.*



More MIDI without tears: Et Cetera's MIDI Link

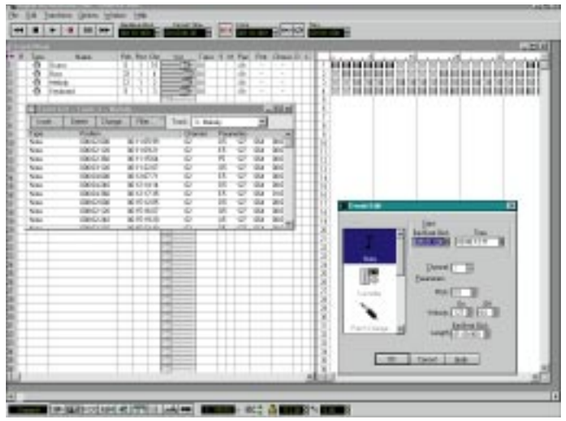
Home brew

Q. "I intend to set up a basic home recording studio. I own a MIDI keyboard (a Korg X3) and have a modest 486 PC with 8Mb of RAM installed, which is currently running Windows 3.11. The X3 has a built-in sequencer but I find it cumbersome to use, and restricting. How I can get a sequencer up and running on my PC? Do I need a sound card, and what sequencer would you recommend? I don't have loads of spare cash at the moment and would therefore appreciate a cost-effective solution."

martin@manic.co.uk

A. If you shop around, you'll find there are plenty of good deals out there that will get the X3 talking to a sequencer on your PC. To save you the hassle, I had a little shop around for you, and discovered some pretty amazing deals. First off, let's have a look at the options available.

The Korg X3 has a "host computer" interface on the rear panel that lets you connect it directly to the serial port of a PC or Mac. The cable can be obtained directly from Korg and costs just £8. In addition to this, you'll need software drivers, which will set you back a further £7.50. Together, these provide a two-way MIDI connection to your PC. Now to the sequencer. I have always recommended Steinberg's Cubase; the reason being that Cubase is intuitive and therefore easy to learn and quick in use. It's also the industry-standard package, so if you wind up in a studio some day, you can be sure they'll have the software you're used to working with.



Digital Orchestrator Plus is currently bundled with Yamaha's Sound Edge, an ideal software/sound card combination for low-cost home recording

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Recipe for success: If you're bored with your sounds, jazz them up with LoveTone pedals

The standard issue of Cubase 3.0 costs around £330. If that's too much to swallow in one go, it's worth considering Cubasis, which comes in at £129. It doesn't have all the features its older brother has, but it's a good place to start.

Another option is to buy a sound card and software bundle. The advantage here is that you'll have a device for playing digital audio and MIDI tracks simultaneously. The best deal I came across was from Turnkey, which is currently selling Yamaha's Sound Edge with a free copy of Digital Orchestrator Plus for only £79. This is a good deal because the full retail price of the Sound Edge is usually £149. And to buy Orchestrator Plus, you'd normally need to shell out another £99.

Love those sounds...

Q. "I have been writing dance and techno music as my main hobby for several years. The problem I have is finding quirky sounds that make my music different from everyone else's. I have a 24-channel mixing console, an Akai S3000 sampler and several sound modules. Are there any general tips you could let me and other readers know about, that could transform my sounds?"

A. The S3000, or any other sampler, is a fantastic creative tool and should be the place to start. There are several ways to source quirky sounds. Sampling CDs are fine, but you can be sure other people have access to the same sounds. I suggest you have a go at making your own.

When I'm looking for "off the wall" sounds, I start with a timbre near to what I expect the end result to be. Then the fun starts. Say, for example, you're looking for a quirky sound that resembles waves crashing. Rather than just using a raw sample of waves crashing, try putting the sound through some effects boxes.

My favourite collection of effects come from LoveTone guitar pedals. Although they were designed to create those grungey, wah wah, and fat chorusey guitar sounds, they also work a treat when digital sounds are put through them. Because the pedals are designed for professional use and built with the best components, they rarely add any unwanted noise and have a great knack of making digital samples sound warm and almost analogue.

The Meatball and Big Cheese pedals (triggerable filter and fuzz box respectively) often find their way into my tracks. TB303 basslines sound fantastically rich, yet dirty when sent to the Big Cheese. Anything that goes through the Meatball more often than not turns to gold.

LoveTone pedals aren't cheap, but you do get more than what you pay for. The Meatball costs £199, the Big Cheese £129 (via mail order only).

PCW Contacts

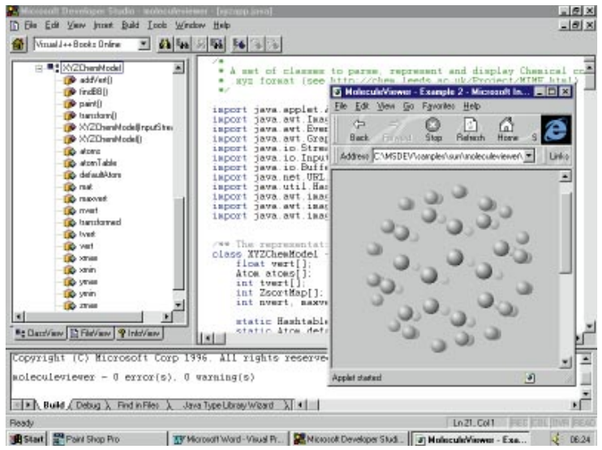
If you have any hints or tips, MIDI-related items or general comments, send them to the usual *PCW* address, or to **steven_helstrip@pcw.ccmail.compuserve.com**

Time + Space 01442 870681
Et Cetera Distribution 017706 228039
Korg UK 01908 857100
Harman Audio 0181 207 5050
Turnkey 0171 379 5148
www.demon.co/turnkey

All together now...

We're all web developers now, says Tim Anderson, who previews Visual J++, deals with Delphi components, lists VB Script limitations, and serves up the Windows 95 system tray.

Should you care about the internet? Over hyped and under-powered, at least for those suffering modem connections, it would be easy to dismiss it as being of little relevance for most developers. Easy, but wrong.



Visual J++ looks just like its C++ partner and creates cross-platform Java applications

Here are three reasons why, to keep your skills marketable, you have to be web-savvy:

Firstly, HTML is here to stay. It is ironic that Hyper-Text Mark-up Language, designed to add a few simple formatting options for web display, is evolving into the new standard for rich-text documents. The closest previous contender was RTF, or Rich Text Format, used internally by the Windows clipboard. But HTML does forms as well as documents, can host Java applets or, in its Microsoft incarnation, ActiveX controls, and is scriptable with JavaScript or VB Script. It blurs the boundary between document and application. The final consideration is the sheer momentum of cross-industry support. For anyone planning a new software project, an HTML front-end must be a strong contender, particularly for database applications.

Secondly, users like browsers. Maybe the network computer will catch on, or maybe PCs running Windows will remain dominant. Either way, the browser is going to be the primary user interface. Once users discover they can manage files, run applications, get help and surf the web, all from the comfort of their browser, they will be reluctant to learn other kinds of interface. For developers, that means creating applications which work well in that context.

Thirdly, networks are intranets. Company intranets solve a lot of problems. Publishing documents, email, and database access are all comfortably handled by an intranet. If you buy a new server operating system, you are likely to find web-server software bundled with it, just as workstation software comes with a browser pre-installed. It is irresistible and companies that have not yet done so will inevitably install intranets alongside their Notes, Exchange, client-server or any other systems. Anyone developing software for use over a network should make it intranet-friendly.

So there are good reasons why software companies are falling over themselves to produce web software, and why you will see increasing coverage of web software tools in this column. The catch is that chaos is heading our way, with wars over standards, languages, objects and web servers. But we are all web developers now.

Visual J++ preview

A late beta of Microsoft's Java development tool has arrived in time for a brief preview. The package is hosted by the same Developer Studio used by Visual C++ and shares some of its tools. If you are comfortable with the Visual C++ environment, you will find the transition to Java easy. Each project can be viewed in a hierarchical class view, or file by file, and online documentation is fully integrated.

A clever touch is the resource wizard which converts compiled resources into equivalent Java code. There is still the problem, inherent to Java, that the Abstract Window Toolkit (AWT) Java class library does not support the range of controls available under Windows. Java projects can be either applets, hosted by a browser, or standalone applications which are executed from the command line using the supplied JVIEW tool.

Microsoft is licensed to produce the 32-bit Windows reference version of the Java virtual machine. The key point of interest is the integration between Java and COM, the object model behind OLE. This enables you to treat Java applets as COM objects and vice-versa. Visual J++ has a type library wizard which creates Java .CLASS files as an interface to ActiveX controls or OLE servers.

You can also expose Java interfaces as COM interfaces and use a tool called JavaReg to register the Java class as an OLE object. This means the Java class becomes accessible to OLE clients like Visual Basic or Delphi, as well as in web applications. Another interesting point is that when a Java applet is running in Internet Explorer, all its public methods and variables automatically become available to Visual Basic Script or JavaScript for scripting, as if the Java applet were an ActiveX control. The snag is that this integration only workd on platforms which implement COM, which essentially means Windows.

Visual J++ is a good Java development tool, whether or not you want the OLE features. Like Visual C++, it is not a visual environment in the same way as Visual Basic, Delphi or Optima. Borland's Latte promises something more along those lines. As proof that Microsoft is serious about Java, though, it is more than enough.

Visual Basic

Visual Basic and the System Tray

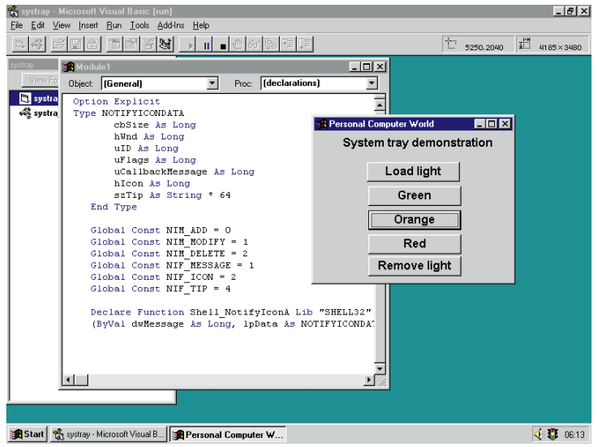
Sagar Shah writes: "*I recently moved up to Visual Basic Pro 4.0 (32-bit). While creating some small utility applications, I ran into a problem with the system tray on the taskbar. I cannot find any entries in the manual which tell me how to add to the system tray. I found the function Shell_NotifyIcon in the WIN32APTI.TXT file, and using this function I can add and delete a blank space but nothing more.*"

The system tray is a corner of the taskbar reserved for status display, in Windows 95 or NT 4.0. It is also called the taskbar notification area. Typically, a utility installs itself as an icon in the system tray, which automatically updates. For example, if you install a modem, a modem icon appears in the system tray when you go online and flashes when data is sent or received. When the mouse is over the icon, a tooltip shows more detailed information, in this case the number of bytes received. Double-clicking opens a dialogue of further options.

All this is done through the Shell_NotifyIcon function. The declaration in VB is:

```
Declare Function Shell_NotifyIconA
Lib "SHELL32" _
(ByVal dwMessage As Long,  lpData
As NOTIFYICONDATA) As Integer
```

The dwMessage parameter is one of three constants which tell the system to add, delete or modify an icon in the system tray. The second parameter points to a record type which can include an icon handle, a string for the tooltip, a window handle and an application-defined message identifier. The idea is that you define a message handler in your application which responds when the user clicks the icon. The message parameters indicate what type of



VB can easily control icons in the system tray, but responding to mouse clicks is more difficult

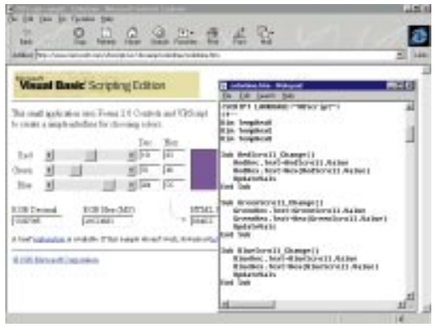
p310

Visual Basic Script — what it does not do

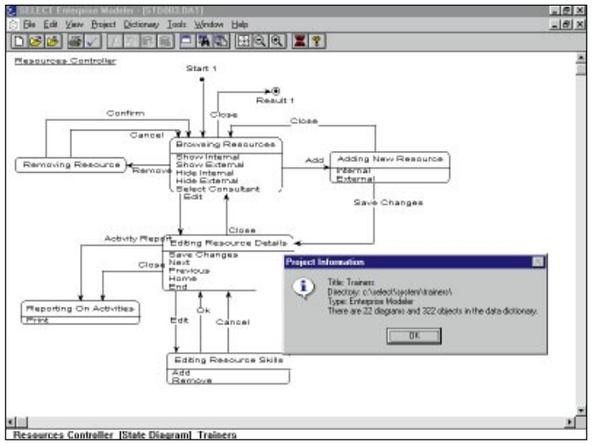
Now that Microsoft Explorer 3.0 is around, VB Script has become useful, particularly on an intranet where you can ensure compatible browsers. Microsoft has also clarified its limitations, some of which are for security reasons while others are merely shortcomings of the language. Here are some of the things VB script cannot do:

- No data access: data access from a web page needs either CGI scripting or special features of particular web servers.
- No debugging: you cannot even step through code.
- No control arrays.
- No classes.
- No OLE automation except the OLE interface to Internet Explorer itself.
- No file operations.
- No types, other than variants.
- No access to system objects like the printer or the clipboard.

Many of these limitations can be overcome by using ActiveX controls, which have unrestricted access to the system. A rogue ActiveX could cause lots of problems, which is why system administrators are watching nervously to see if the digital signature scheme for verifying ActiveX controls is successful in preventing viruses.



Visual Basic Script is fine for scripting, but with major limitations



SELECT for Visual Basic Enterprise: not for the faint-hearted

mouse event has occurred. Your application window can be hidden so that it only pops up when needed.

Unfortunately, not all this functionality is available from Visual Basic. You can easily make an icon appear and set the text for the tooltip. But since VB has no way to intercept custom messages, you cannot make a dialogue appear when the user clicks the icon.

The way round this would be to use a control like MessageBlaster that adds this feature to Visual Basic. If you are content with more limited features, you can easily create an application like the example on our cover-mounted CD.

Note that you need to include an icon handle in the NOTIFYICONDATA record. You can obtain this in several ways: one is to use the icon or picture of a form or control; another is the LoadIcon API function; or there is the LoadResPicture function which works on icons stored in a resource file. The technique used in the example is to call LoadPicture to place an icon into an invisible image control, and then use its picture property to obtain an icon handle.

SELECT for Visual Basic

Bridging the gap between those who theorise about business object models and actual working systems is no trivial matter. SELECT is a set of tools based on object models developed by J Rumbaugh and Ivor Jacobson. There is a modelling tool, from which you can generate both SQL code and a set of Visual Basic forms and classes. There is also an automatic documentation feature that works with MS Word. SELECT needs the VB Enterprise edition, while other versions work with Forte and C++.

Unlike other tools which you can pick up and drop as required, committing to SELECT is almost a way of life. It replaces the free-and-easy VB style with a rigorous development process.

The best advice to those considering a system such as this is a careful evaluation procedure including full consultation with others actually using the system.

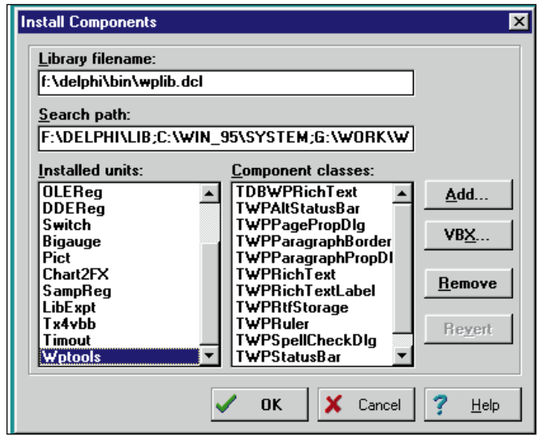
DELPHI

Using components in Delphi

When it comes to components, Delphi users have a difficult decision. The most obvious solution is to use VBX controls in Delphi 1.0, or OCX/ActiveX in Delphi 2.0. These component types are abundant, mainly thanks to the popularity of Visual Basic, and now that ActiveX plays a key role in Microsoft's internet strategy, you can expect them to proliferate.

Often, the component you want is only available in VBX or ActiveX form. The second advantage of these Microsoft standards is that they can be hosted by several different tools. For example, a VBX can be used by Delphi, Visual Basic and Visual C++, provided you use the 16-bit versions.

Unfortunately, these benefits are balanced by several problems, one of which is compatibility. Some VBX vendors assume that their controls will be hosted by Visual Basic and that not all their features work in Delphi. In particular, data-bound VBXs lose their data-aware functions in Delphi, if they work at all. Another problem is getting at certain VBX properties, such as string properties which Delphi converts to Pascal string types, cheerfully truncating them if needs be. OCX controls present a different set of problems, but since there are several different levels of OCX compliance, compatibility is by no means guaranteed. Finally, you cannot easily build either VBX or OCX components in Delphi. Borland has considered providing an OCX wizard to convert Delphi native components, but so far it has not emerged.



Delphi components are installed by rebuilding the component library. But which component type is best?

Delphi Component Options

Component type	Pros	Cons
VBX, ActiveX, OCX	• Widely available •Shared between applications	• Not always compatible • Cannot easily create in Delphi • Version control problems
VCL	• Best performance • Can create or customise in Delphi •No version control problems	• May not be available • Not shared between applications

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A book for visual programming

■ *Rapid Development* by Steve McConnell

Software projects are notorious for going wrong. The concept of rapid application development seems to offer a solution by using tools that dramatically cut programming time, but there are still plenty of problems.

Whereas his previous book, *Code Complete*, studied the detail of coding and debugging an application, this one analyses the whole development process, exploring common reasons for failure and offering tips for a successful strategy.

Really, the book is mis-titled. It is not only about rapid development, but any kind of software project. If your emerging application is suffering from feature-creep, unrealistic schedules, tools that do not work, problems integrating work from different team members, heavy overtime and low morale, then McConnell will tell you why, how to rescue the project, and how to avoid repeating history next time around.

Although the author does not focus on specific languages, there are some good observations about visual programming. The key advantage of products like Visual Basic and Delphi is reduced coding time, but there are associated risks. The main ones are over-estimated productivity savings, failure to scale well as the project expands, and the encouragement of sloppy programming. The answer is to be aware of the limitations of a particular tool and to allow time for working around them. Another key point is that the larger the project, the less time is spent on coding as opposed to other elements like designing and testing. Therefore, visual tools yield their biggest benefits on small projects.

There are plenty of case studies and examples in the book, although it is a shame that most are invented rather than real-life projects. It is repetitive in places and at times dispiriting, as the author tends to focus on how *not* to do things. But this is excellent reading for developers, especially those who work in a team.

compare with QuickReport for efficiency. Other leading component vendors have been slow to support Delphi but may find themselves losing sales to smaller upstarts as a result. A good example is WPTools, a VCL-implementation of a rich text edit control. This one works in 16-bit Delphi as well as Delphi 2.0 and is not just a wrapper for the Windows 95 common RTF control: it supports large documents, fonts, styles, images and hypertext links, and full source is available to registered customers. Look out for a full assessment in a future article.

Delphi 2.0 16-bit?

Borland is considering an update to 16-bit Delphi, and is using the web to survey developers about what features they would like and whether they would buy it. TI would prefer to see resources go to developing Delphi for 32-bit Windows. There is still a big market for 16-bit development, but I sense that the tide has turned. Companies have both NT 4.0 and Windows 95 from which to choose and web developments favour 32-bit Windows. It is too late for 16-bit Delphi 2.0, and Borland risks getting it wrong again.

A third-party has produced a full-featured rich text control as a native VCL component

To avoid the problems with VBX and ActiveX you can extend Delphi's Visual Component Library either by coding your own custom components or obtaining add-ons from a third party. Coding your own is fairly easy, although harder than straight Delphi programming. The advantage of native components is full compatibility and the most efficient interface between the component and the rest of your application, and therefore the best performance. The disadvantages are that the component can only be used in Delphi, and if you have several applications using the same component, inefficient use of disk space because the whole component is compiled into every executable you create. If this becomes a major problem, you can move parts of the code into dynamic linked libraries so it is shared between applications.

Frankly, in most projects a VCL component is preferable where available. Availability is the problem, but the situation is improving. Delphi 2.0 includes the QuickReport component which is vastly more efficient than wheeling in ReportSmith.

Crystal Reports 5.0 also comes with a VCL, although the huge Crystal DLLs do not

•PCW Contacts

Tim Anderson welcomes your Visual Programming comments and tips. He can be contacted at the usual *PCW* address or as **freer@cix.compulink.co.uk**

Visual J++ (price not yet announced) from Microsoft 0345 002000

WP Tools is shareware from Julian Ziersch, 100744.2101@compuserve.com

SELECT VB Enterprise Edition £2,995. SELECT Software 01242 229700

Rapid Development by Steve McConnell, (Microsoft Press). £32.49 from Computer Manuals 0121 706 6000

Rules of the road

Stephen Rodda customises a highway code for networks. And, slave to his readers' requests, turns from Windows to OS/2 to install IBM's new Warp Server 4.0.

I have been criticised for not mentioning IBM's products in my networking column. So when IBM issued a new version of its Warp Server (hitherto called LAN Manager), I decided that I should get a taste of it.

When I attempted to install the package, this is what I got: "*WARNING: The OS/2 Installation program has found some hidden Microsoft** Windows** files on drive C. If you continue to install OS/2 on drive C, you will not be able to start Windows NT after installation. If you continue, you must use OS/2 to format drive C. You can choose to exit, and then install OS/2 on any drive other than drive C.*" Since this was on a system bootable into either Windows 95 or NT, all the stupid installation program had to do was take a copy of the boot sector and then pretend that it was a DOS disk, using the boot program as usual.

Not one to be dissuaded from my intentions, I copied the boot sector using an old version of Peter Norton's Utilities 4.5. I'm afraid I am a bit of a Luddite about these things — and that's some confession, coming from a technology journalist. But when all I want to do is read a bit of disk and save it as a file until the MS-DOS format changes, I'll carry on using Norton 4.5.

I rebooted but OS/2 still didn't like the hidden NT files. I took a directory listing, using DIR/B and wrote it to a file, then used ATTRIB to flag all files -R -S -H and had another try. I thought "thank goodness I'm writing about it while I'm doing it". At least I got something productive done while "fiddling" around (*I had considered using another word instead, but you can fill it in for me according to your sensitivities)*. It still stated that I had some hidden files in the directory, which was patently not true. So I telephoned IBM support and within a few minutes they'd confirmed my suspicions that it wasn't just the NT files but the whole VFAT (Windows 95's method of putting long file names on a FAT partition) structure which OS/2 didn't like. My first reaction to being told that I should repartition or reformat the disk was "I don't believe it!" I know MS and IBM have been having an extended war where each has worked hard to prevent its own product running under the other's operating system (Windows 3.11 upgrade being a case in point) but IBM not supporting VFAT, which has been out since NT 3.1, seems a bit thick to me.

Since I was using a review machine (the AMD K5-100) and there was nothing important on the hard disk I decided to overwrite the hard disk contents. Once I'd decided not to keep any of the old data, installation went like clockwork, although I was surprised that there was no Novell/Eagle NE2000 adaptor. The NE2000 Plus was supported, so I tried using that instead despite the thought that I'd probably have to do something about it later. Something which surprised me was the fact that nowhere in the documentation did I find a mention of Apple Macintosh file sharing — and this from a server package.

As far as the Novell NE2000 driver is concerned, I had forgotten that OS/2 automatically takes note of the fact that the adaptor card isn't an NE2000 Plus and configures itself from there.

The AMD K5-100

Do you want an 80586-100 for the price of an 80586-75? …doesn't everyone? I had a loan machine from AMD, complete with one of their 80586 clones. I use the term 80586 rather than Pentium, because the Pentium is a trademarked name and a series of numbers isn't.

The clone makers have had to resort to all sorts of tactics to make their chips seem different (branding, I think it's called). AMD has an 80586 chip which performs (from my usage tests) every bit as well as an Intel Pentium P-100. The AMD K5-100 sells for within a pound or two of the Intel P75, so you really do get more bangs per buck!

I've also been trying to get hold of the new Cyrix 686-in-a-586-package chip as I've heard good things about it, but as yet I seem to be getting nowhere, fast.

Letters

This month I'm devoting the letters section to Windows 95, and you'll find that some of the enquiries come from someone you already know!

Q. "*My installation of Windows 95 seems to be running slower (especially when browsing the machine). Can you suggest anything to improve the speed of the program?*"

Stephen Rodda

A. If you've got the hard disk space, I'd suggest that you reinstall Windows 95 into a different directory (or folder) to see whether slow-down occurs then. It is possible, if you install and test many different programs, for the registry to become corrupted or overloaded.

A fresh installation of Windows 95 should sort out the slow-down. Make sure the slow-down isn't due to trying to access a CD. Your search path could possibly be pointing there.

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Networking Rules

I was flying back from the UK to the Netherlands the other day and as the aeroplane was preparing for landing the thought struck me, seeing all the little drainage channels and noting how orderly everything was, that networks also need order imposed on them to operate properly. "Why not set out the bones of a networking rule book?" I thought. So here is my own version of a set of guidelines to which you can add or delete from, as you see fit, to create your own networking rules.

1. **Use easily-remembered passwords which are changed monthly.** Depending on the sensitivity of your data, you may be prone to a dictionary-type password attack. There are two ways to defeat this: firstly, make sure that a type of "three strikes and you're out" password checking is enabled and secondly, make sure that all passwords are made up of two common words, concatenated. The first method will disable an account for a set period if an attacker (or even the user) types the wrong password for the account a number of times in a preset period. See the screen shot from NetWare (Fig 1) showing this form of lockout. The second ensures that the password is easily remembered but unguessable. A password in this vein could be sausageprinter. Certainly it's easily-remembered but it's also a totally illogical series of characters.
2. **Back up your data at least once a day.** Even if it's only an incremental or differential backup, please do it! Remember to make a full backup every week and to keep it and your end-of-the-month backup tape in a safe place (preferably off the premises).The reason that I recommend a full backup once a week is so that you don't end up having to fish out a hundred different tapes containing the past four months' incremental backups.
3. **Don't allow unauthorised or unknown programs to be run on your network.** You don't want to risk getting attacked by "Trojan horse" type programs (i.e. those which pretend to be one sort of program and end up formatting your hard disk accidentally-on-purpose). Believe it or not, there is one which masquerades as a version of PKZIP. Make sure that you only use programs from recognised and responsible sources (cover disks are usually fine, as is Cix and such places where all programs are scanned before being made available).

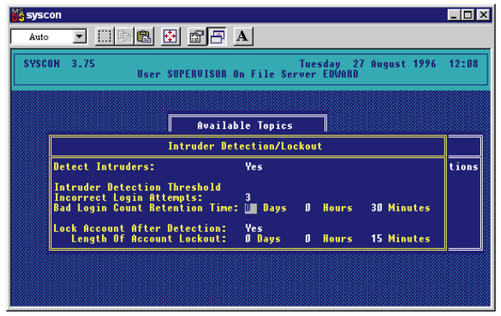

Fig 1 NetWare's intruder detection lockout enabling screen

4. **Scan all disks from outside, for viruses.** Although this is obvious, it's surprising how many times people get caught out by viruses. Don't just assume that a large company site is free of viruses. We've been caught napping by a virus which was widespread throughout the reprographics industry at that time. Remember that bureaux and the like can be hotbeds of infection and always make sure that you scan your floppies and removables before using them if they've been off your premises.
5. **If you must connect to the internet, make sure that you do so safely.** Remember that a firewall is the safest method of connecting to the internet but if your connection is only temporary in nature (like a dial-up connection), then it'll take someone with real determination to stay on a leased line, keeping a look-out for you, and then to attack your system while you're there on the dial-up link. Not a common problem I should have thought, but one worth bearing in mind.
6. **Don't allow people to let a third party log in under their names and passwords.** Apart from the fact that this is sloppy practice, it also defeats the advantages of email and so forth and exposes a password to (possibly) an outsider.

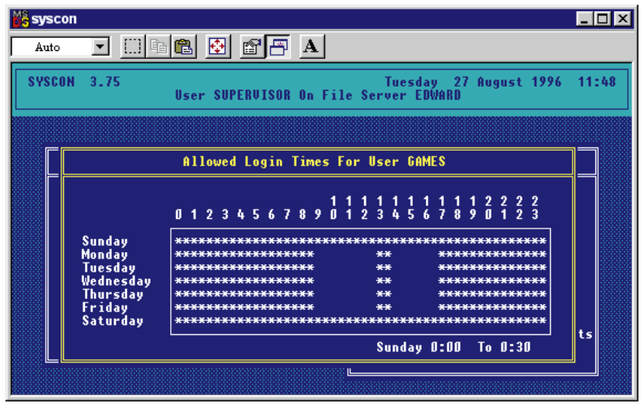

Fig 2 How a login can be configured so it's available throughout what *isn't* the working day

7. **Enforce logging out when the workstation is unattended for a significant period of time.** This can stop people leaving their machines logged on all night, allowing passers-by access to sensitive data. It can also get people into the habit of switching their machines off at night, which is good for the ecology.
8. **Stress to everyone that data which they wish to be backed up is stored on the network.** Some server-based backup programs will back up workstations, provided they are switched on. Save lots of electricity by backing up the server only.
9. **Impress upon everyone that despite their data being stored on the same machine(s) as everybody else's, as long as their data is stored in their own home directory it is secure.** People don't seem to realise (notwithstanding rule 12) that if a networking system allowed people, apart from the administrator, to wander through others' data then the company selling the networking system would very quickly go out of business.
10. **Negotiate and enforce a company-wide policy on playing (network) games.** People will probably want to play Doom and Quake. If you can arrange that these are available perhaps through special games logons but also outside working hours, this will probably remove the temptation to bring in their own games from outside (Fig 2).
11. **Since they're bound to do it anyway, impress upon people the correct method of moving their machines.** This is useful if you're using 10base2 (coaxial Ethernet) because if the cable is broken for a significant length of time the whole segment of the network is disabled. This is not such a necessity with 10baseT and token ring and their variants but as long as users understand how the network is cabled, callouts will probably be minimal.
12. **Keep the file server in a locked room.** There is no good method of preventing someone with physical access to the machine from reading the data on the storage system. Remember that the security inherent in NetWare or NT does not prevent someone with a suitable boot disk from accessing the system as an administrator. The safest place for data is on a disk which is attached neither to a computer nor a network and which is stored in a strongroom. Disk encryption hardware does exist but it is far from commonplace. We must therefore compromise.

Q. "*I've been trying to share my fax or connect to another, shared fax. I don't seem to be getting anywhere. Windows 95 won't recognise the shared fax on another machine. Can you help, please?*"

Jeff Sanders

A. This is a problem which Jeff, my business partner, has been having. It's always a bad sign when he starts cursing, because I know he's starting up a PC. Actually, I think he likes to have something to complain about.

He's been asked to design a book for a charity and, of course, he decided to use Ventura Publisher. In our experience, it's the only reasonably ordinary program specifically designed for book publishing. So in order to send proofs to the client he needed to use a fax. His machine has only one communications port (for a variety of reasons, mainly to do with the fact that it uses an old NE2000) and that is taken up by the mouse. We decided to use Windows 95's built-in fax sharing, so I could get on with my work while he faxed the document through my machine.

Firstly, we had to make sure that the machine (where the fax is installed) had got file sharing enabled and accessible via the Network control applet in the Control Panel (see Fig 3). Of course, on my machine, I was sure that this was the case.

Secondly, Microsoft Exchange does get its knickers in a twist occasionally and you can do far worse than removing all the exchange components, rebooting and reinstalling from the CD once again. Another thing you could check is whether the machine is actually visible on the network. If not, a simple network diagnosis should sort out any problems you may be having.

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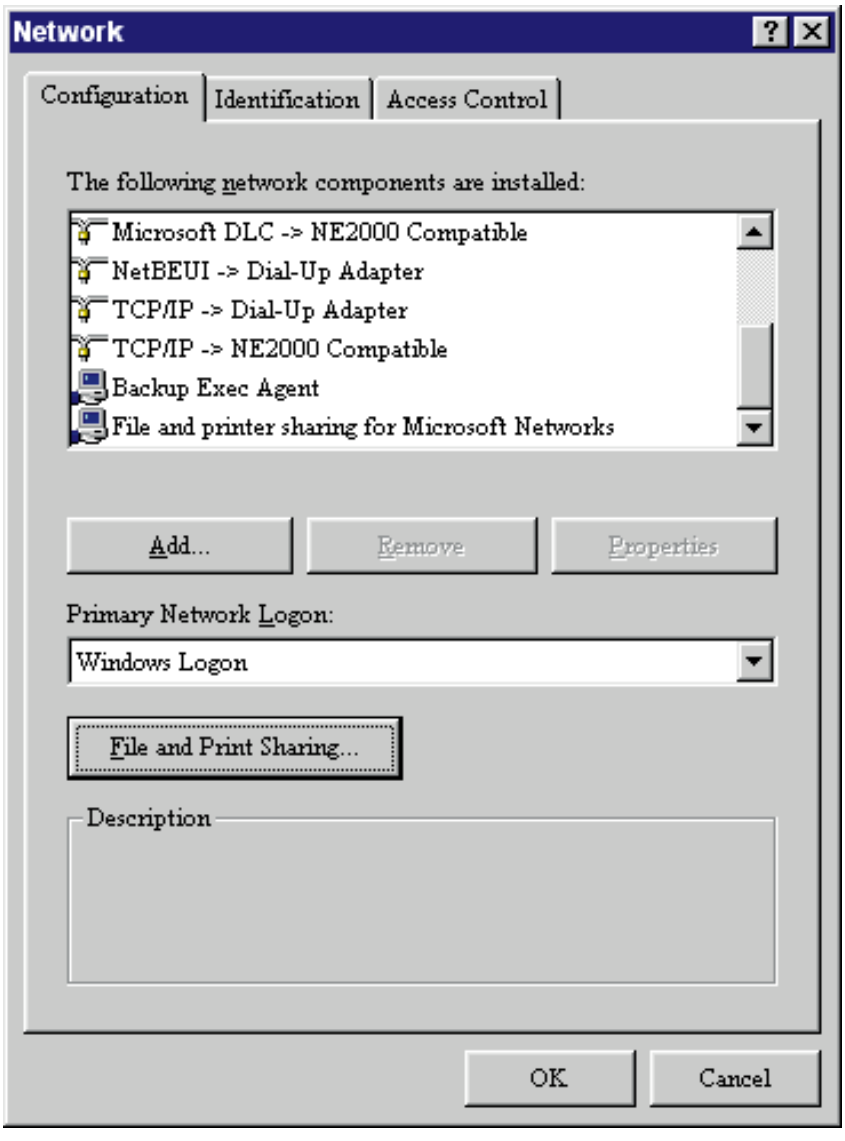

Fig 3 The Network control applet, showing the file sharing button

I removed Exchange, rebooted my machine and reinstalled it. What a total pain in the fundament that was! I remembered that removing Exchange would remove Microsoft Fax but I'd forgotten how heavily-intertwined the comms part of Windows 95 actually was — until I discovered I'd removed the Microsoft Network as well.

Coming soon

I was chatting in the pub to a mate who is an avid reader of my column the other day and he mentioned that he hasn't yet come across a very simple explanation of how to put together a small network. So next month, I shall be concentrating on this, if only to shut him up.

Quick tip

I gather from my sources that many Macintosh LC475s are starting to show errors on booting, giving the same signs as would a dead motherboard. Apparently it's the PRAM battery which, once changed, restores the machine to its original working state. I also hear that some less-reputable or knowledgeable repairers are replacing the motherboard (and charging for this repair) when all that's needed is the battery replacement. You have been warned!

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California dreaming

Everything seems to be rosy in the Apple garden, as Howard Oakley discovered when he went to California. Mac OS 8 is under construction, and famous faces are in the corridors.

Finding myself in California, I took the opportunity to visit Apple's R&D building at the wryly-named 1 Infinite Loop, Cupertino, ostensibly to find out about QuickTime 2.5 and its future. Bearing in mind tales of imminent corporate disaster, I was pleasantly surprised to see a huge and active campus, from the Apple Fitness Centre on Bandley Drive, to giant models of the infamous "dogcow" (an intermediate species featured in the page orientation icons of the Page Setup dialogue) and other iconic nobility.

There were no vacant parking spaces, empty offices, or worried faces. Plenty of employees were walking round barefoot, some arrived on skateboards or inline rollerblades, but all were purposefully busy.

Another acquisition from the Apple Company Store's fine collection of Mac software was Fractal Design's Poser. This allows you to pose and render an infinite variety of different human models, against PICT backgrounds. Already widely used in as diverse fields as ergonomics and advertising, it is also great fun

Star spotting

While in the lobby of 1 Infinite Loop, sensing the nearby industry of hundreds of programmers crafting Mac OS 8, I saw Don Norman, emeritus Professor of Cognitive Science, and Apple Fellow. Thankfully I had just left the Apple Company Store with a copy of Voyager's CD-ROM, "First Person: Donald A. Norman", which contains his three seminal works on human-centred design. Back in the UK, I thought it would be a delight to browse his thought-provoking books with the added benefit of original talks and hypertext links. But there were some hurdles to overcome first.

This CD is one of a series (others cover Marvin Minsky's work on artificial and real intelligence, and Stephen Jay Gould on evolution) released in 1994, using HyperCard, QuickTime and custom fonts. So, I first had to install the stacks and their fonts onto my hard disk.

As I had bought all three, I opened one of the font suitcases and ensured it contained all the fonts required for the different CDs, by opening the other two suitcases and dragging extra fonts over to it. Sometimes you can avoid actually having to put such a suitcase in the system folder, by keeping it in the same folder as the application. But as this was HyperCard, this ploy did not work, and I had to drop the composite suitcase onto my active system folder to install the fonts.

HyperCard hassle

Once this was done, I tried opening Don Norman's stack using my copy of HyperCard 2.3, the latest version which runs well on Power Macs. While much of the text content worked correctly, graphics and displays were missing. My next thought was that this was the result of running at 800 x 600 pixels screen resolution and 32-bit colour, so I quit HyperCard and opened the Monitors and Sound control panel. This quickly brought me to a more standard 640 x 480 and 256 colours, but the stacks were still broken.

The solution lay in reverting to the copy of HyperCard 2.1 supplied on each CD. Although not as fast and fancy as version 2.3, this still runs sweetly on modern Power Macs, and clearly provides facilities on which Voyager's stacks are dependent. A more traditional printed book which had nearly cost me excess baggage was Hayden Books' 1300-page *Maclopedia*, a monumental compilation of all things Mac, from Apple history to internet shareware.

QuickTime 2.5

Back at the leading edge, this latest version of QuickTime is a major release which will delight those with Power Macs (bringing them speed increases of 20 to 200 percent), MIDI musicians, and many more. Unlike other system software components, there are only cosmetic differences between the British and US localised versions, so you can use whichever is easier to download.

Charles Wiltgen is maintaining informative FAQ pages on the web which list the new features in 2.5, and detail all the compression/decompression "codecs" available. Sadly, these still exclude AVI, making it messy to convert or run many Windows movies, but now include MPEG. I was heartened to hear that QuickTime is already running well under Mac OS 8.

Mac OS 8

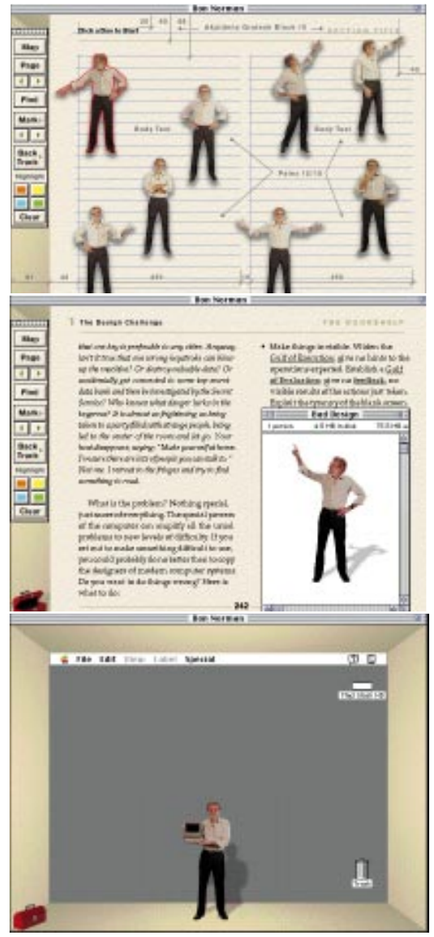
A major advance touted for Mac OS 8 is memory protection, to make Macs more stable in the face of crashing software. The current situation is a mess. Although almost all Macs have hardware memory management units (MMUs) which could implement this, legacy usage and code in the system and third-party applications have made it impossible.

In order to maintain an acceptable level of backward compatibility and accommodate other design requirements, Mac OS 8 will not place the system and each application in their own protected memory spaces. Most applications will share a single address space of up to 4Gb, with only faceless "server" applications enjoying their own protected spaces.

Critics claim that this is a major weakness, and that Mac OS 8 will not improve stability much. In practice, though, it should prevent most situations in which a crashing application can take the system out too, forcing you to restart.

Another major culprit is the rogue or conflicting extension. Mac OS 8 will introduce a new architecture to support system patches which are currently the bread-and-butter of most extensions. This new Patch Manager should be a big step forward. In practical terms, you should be weaning yourself away from dependency on large and complex extensions, but need not be scared of investing in new applications, or upgrading existing ones.

Next month I will consider the changes in human interface under Mac OS 8.



Don Norman, on his Voyager CD-ROM, doesn't even spare Apple his sharp criticism of interface design

Crash course

An Aide Memoire

1. If the crashed application remains open, try Cmd-Opt-Esc which forces it to quit, or click on a "bomb" dialogue to quit the application, or restart your Mac.
2. Restart your Mac using, in order of decreasing preference:
Special/Restart Finder menu command.
Power key produces the restart/sleep/shutdown dialogue.
Cmd-Power breaks into MacsBug (if installed), then type rb and press return to restart.
Cmd-Control-Power forces restart (on some models).
Cmd-Opt-Shift-Power forces restart (on some models).
Restart switch/button. Press this if provided on the case of your Mac.
Press on/off switch to turn off, if one is fitted.
Disconnect from mains if all else fails (most damaging).
For the last two, you will then have to start your Mac up again.
3. Get your Mac restarted successfully. Using Shift disables all extensions if held during startup.
Cmd-Opt-Shift-Del bypasses the current startup disk, picking the next instead.
Cmd-Opt-P-R zaps the parameter RAM, which may be messed up.
4. Run Disk First Aid to verify at least the startup disk (containing the active system folder).
5. Using Disk First Aid, repair any disks reported as being damaged. Remember it cannot repair the startup disk: you may need to restart from another hard disk, or the Disk Tools floppy disk. Don't soldier on with a potentially damaged file system. It will only lead to more crashes.
6. Look at the Wastebasket. If it contains a folder named (for example) "Rescued items from HD20", you may be able to recover those files by starting the application which crashed.
7. Check possible causes of the crash, including extensions, control panels, disk drivers, applications, and preferences (in the preferences folder within the active system folder). If damaged, they should be thrown away.

Apple's Disk First Aid remains the primary utility for checking and repairing disk damage

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or **CompuServe 70734,120**
Apple Computer is on 0181 569 1199; www.apple.com and www.euro.apple.com
Voyager's "First Person: Donald A. Norman, Defending Human Attributes in the Age of the Machine", ISBN 1-55940-506-6. CD-ROM costs around £30.
Maclopedia, ISBN 1-56830-281-9, is published by Hayden Books at £54.95 net of VAT.
The QuickTime FAQ web page is at www.QuickTimeFAQ.org/
Fractal Design's Poser 1.0 costs £89 from Computers Unlimited on 0181 358 5857.

Hard disk know-how

Types, performance, upgrades and SCSI *vs* IDE. Eleanor Turton-Hill helps you get to know your hard disk.

The hard disk is that part of your system which holds all the programs, documents and data when your PC is switched off. The longer you have your computer, the more documents you create and the more data you store, the more valuable your hard disk becomes. In fact, hard disks which crack up can put small companies out of business in a flash.

In short, your hard disk is the storage place for your valuable work, so it's important to have a good understanding of how it works. Here, I'll be answering some common questions about hard disks including what to look for when shopping for one, how to upgrade and how the hard disk affects the performance of your PC.

Virtually all hard disks today use a set of read/write heads that float above a rapidly-rotating rigid metal plate. Here you can see that the hard disk is made up of multiple platters and multiple heads which increase the capacity and speed of the disk drive

How many types of hard disk are there?

It is now well known that the internal parts of the average home PC do not (alas) fit together like the bricks in a Lego set. However, as the personal computer market matures, universal standards are gradually making an impact on the design and compatibility of PC hardware. But it's a slow process and, as with many other consumer products, standardisation is a difficult and messy process.

One of the earliest and most significant standards introduced into PC hardware was IDE (Integrated Drive Electronics): a standard which controls the flow of data between the processor and the hard disk.

The IDE concept was initially proposed by Western Digital and Compaq in 1986 to overcome the performance limitations of earlier subsystem standards like ST506 and ESDI. The term IDE itself is not an actual hardware standard but the proposals which had been put forward were incorporated into an industry-agreed interface specification known as ATA (Advanced Technology Attachment). ATA defines a command and register set for the interface which creates a universal standard for communication between the drive unit and the PC.

One of the major innovations brought about by IDE was the integration of the disk controller functions onto the disk drive itself. The separation of the controller logic from the interface made it possible for drive manufacturers to enhance the performance of their drives independently — there were no performance-boosting features incorporated into the ATA interface itself.

Mass acceptance of the IDE standard hinged on its ability to serve the needs of the market in terms of the two most important criteria: cost and compatibility. Over the years, these two factors have been more significant to mainstream PC users than high performance and thus IDE has become established as a mass-market standard.

How is disk performance measured?

The speed of a hard disk can be measured in different ways and it is important to know exactly what figures are being quoted when you're shopping for a new one. The performance of your hard disk is very important to the overall speed of the system. A slow hard disk will hinder a fast processor like nothing else in your system can.

As an initial gauge, look for the drive's "average access time": the time taken by the drive to locate the track on which a piece of data is stored, and the specific place on that track where the data is sitting. This is usually quoted in milliseconds (ms).

In addition to "average access time", also look out for "transfer rates". The transfer rate is the speed at which the drive can deliver the data from the disk platters to the CPU. This is generally described in megabytes per second (Mb/sec).

In order to get an accurate view of a hard drive's performance, the average access time and the transfer rate should be looked at in tandem. Drive makers and dealers have a reputation for bending the truth on such issues and are often found to quote the fast access time of a drive, without any mention of the transfer rate —you'll see this in advertisements, too. Unfortunately, a high access time coupled with a slow transfer rate produces a slow drive.

Because access time is measured in milliseconds and transfer rate is measured in Mb/sec, the overall drive performance can be difficult to get your head around. Essentially, you're looking for the lowest possible access time and the highest possible transfer rate.

Another measure of hard disk performance, of which you should be aware, is "seek time" which is conveniently confused (by some people) with the access time. Seek time is also measured in milliseconds and defines the amount of time it takes a hard drive's read/write head to find the physical location of a piece of data on the disk. The seek time says absolutely nothing about the speed of a hard drive.

The importance of the access time and transfer rate is that they tell you how long a hard drive takes to locate and retrieve data.

How do I upgrade my hard disk?

Computer technology changes quickly. Every year, processor speeds increase and hard drive capacity grows. Before you know it, there's a new generation of feature-rich software waiting to cripple your poor aged PC. Sooner or later you'll have to face up to the fact that your machine is becoming outmoded, and find some way of dealing with this.

The speed of your hard disk has a major impact on the overall performance of your machine. Hard drives found in old computers tend to be physically large, slow, power-hungry and of limited capacity. If your machine is really ancient, a modern IDE hard disk would greatly improve performance.

Before splashing your money around, there are a few basic facts you need to know about your PC. First, take the lid off and look at the arrangement of components. The first and most obvious thing to find out is whether you actually have room for another hard disk.

Check up on the manufacturer of your hard drive and the drive's type (if you've lost your manual, look at the machine's setup screen) before you go shopping for a new hard disk because the BIOSs (Basic Input/Output System) in some older machines do not officially support IDE. Ask the dealer whether the new drive will work in a "master/slave" configuration with the old one and finally, cover yourself by checking that the drive you buy has a "no questions asked" return policy.

There are essentially two types of modern drive interface: SCSI and IDE (*see the panel*). We'll concentrate on the more common IDE variety. Unfortunately, adding a second IDE drive is not always a simple procedure, because not all IDE drives work to the same standard. If both your drives adhere to the ANSI standard (ATA), both drives should happily co-exist. If they are incompatible, you could end up throwing away your old one.

IDE drives can control two hard disks on the same cable and, in order to make them work together, one must be set up as a slave and the other as a master. This can be done fairly simply by moving a jumper at the back of the drive from one position to another. When you plug in the drive, make sure that the cable is plugged in the right way around, otherwise your machine will appear to be dead when you turn it on. Pin 1 is usually marked so that you can line up the cable in the correct way.

The hard disk which you buy will generally be faster than the one you've already got so set this one up as the master and your existing one as the slave. They'll work more efficiently together if you store your applications on the faster disk and data on the slow one.

Once you've physically connected your new hard drive to the machine, you will have to configure the PC's BIOS . The BIOS contains a series of entries such as number of heads, cylinders and sectors per track which define the type of hard drive in the machine.

Generally, you can get into the BIOS setup utility by pressing a key combination when you boot up. Here you'll need to configure the hard drive type number as well as other system configuration details. Make sure you have all the information you need before you go anywhere near your BIOS or you could end up frustrated for hours, or even days, trying to put it right.

IDE and SCSI

If you've ever leafed through one of our *PCW* computer group tests you couldn't fail to have noticed the many seemingly-incomprehensible acronyms like those I've already mentioned. They refer to interface standards which define the way in which the hard drive connects to your PC. In the first generation of computers, the electronics to manage the hard disk were placed on a separate controller card. Technology has moved on since then and the same advances in microchips, which have led to faster processors and cheaper memory, now enable the controller function to be placed on the disk itself.

■ Integrated Drive Electronics (IDE) is currently the most common hard drive interface and is also (not by coincidence) the least expensive. IDE disks are connected to an interface card by a cable which extends the signals from the bus inside the PC. The cable does not plug directly into the ISA bus so it either goes into an interface port on the main board, or into an interface card. The IDE standard supports two disks connected together, the first acting as a controller and the second as a slave, with both disks sharing a single I/O (input/output) address and interrupt.

■ Enhanced IDE (EIDE) is a much-upgraded version of IDE. All computers built since 1994 should have an EIDE hard disk controller and this provides many advantages over IDE. Firstly, EIDE can support four devices (instead of two) which don't necessarily have to be hard disks. They can also be CD-ROMs or tape drives compatible with the EIDE standard. Secondly, IDE was always restricted in that it would not support hard disks larger than 528Mb. The third, but certainly not least, improvement was in the massive increase in data throughput compared with standard IDE. This massive speed enhancement puts EIDE on an equal level with SCSI as a high-end drive interface.

■ SCSI (pronounced "scuzzy") stands for Small Computer Systems Interface and is another standard for connecting hard drives and peripherals to your PC. SCSI hard drives are very fast and very expensive. They act as good interfaces for high capacity hard drives used as network file servers and for very high-powered scientific and engineering applications. For the average user, it is not really worth spending lots of extra money on SCSI, especially as EIDE now provides similar performance results.

•PCW Contacts

Eleanor Turton-Hill welcomes feedback and suggestions from readers. She is at **ellie@vnu.co.uk**

No-nonsense **Buyer's Guide**

Buying a **PC**

The one universal rule is that PCs get cheaper, better and faster all the time. The result is that your state-of-the-art PC can become outdated and old-fashioned in a couple of years. It may still work perfectly well, but it probably won't run very fast and won't run the latest software. If you're just planning to do simple word processing, this may not matter. But we're assuming here that you want to buy a general-purpose multimedia PC that can play games, use CD-ROMs and run a range of modern software.

Buying Don'ts

- Don't buy a machine with less than 16Mb of memory if you plan to run Windows 95.
- Avoid cheap 14in monitors.
- Bundled 14,400 modems are not the bargain they seem. Opt instead for a 28,800 modem.

Buying Do's

- You can never have too much disk space. Spend extra cash on buying the next largest hard disk size.
- Make sure that Pentium motherboards have an Intel Triton chipset.
- Check the warranty. Is it for on-site or back-to-base repairs? If it's on-site, does the manufacturer offer guaranteed response times?
- Check the technical support. Is it free? Is it easy to contact?
- If you're buying the PC for home use, you'll probably want full multimedia capabilities to enable you to use CD-ROM games and edutainment products and play video clips. This should include at least a 16-bit SoundBlaster-compatible soundcard and speakers.
- Think about upgrading your memory immediately. RAM prices are low at the moment — you can pick up 16Mb of EDO RAM for around £100 or less if you want to do your own upgrading. It is also the quickest way to improve the performance of your machine, often more so than upgrading your processor.
- Look at the software bundle. If you want an office suite it is far cheaper to buy it as part of the bundle: larger manufacturers can offer MS Office, for example, at about a third of the RRP. Multimedia CD-ROM bundles will not include the UK version of Encarta'96 — Microsoft will only allow the US version to be bundled.

Other things to consider

PCs have become more similar in the last few years. The days when smallish computer companies designed their own chipsets (the chips that assist the computer's main processor) are long gone. Most small box-shifters buy their motherboards from Taiwanese manufacturers. Larger companies either design their motherboards themselves (Apricot, Compaq, IBM) or get motherboards built by other companies to their specifications (Gateway).

Most manufacturers now use Intel Triton II chipsets: either 430HX or 430VX. The HX chipset is reckoned to be better for office applications and is optimised to work well with large arrays of EDO RAM. The VX chipset works best with multimedia applications and SDRAM.

Cyrix chips are worth considering. Their 6x86 chips, such as the P133+, are often cheaper and give better performance than their Intel counterparts.

If you are serious about multimedia, it may be worth upgrading your soundcard to a 16-bit wavetable card. A six-speed CD-ROM drive will give you a noticeable performance gain over a quad-speed, but the speed increase of an eight-speed over a six-speed is less tangible. Remember that, unlike your hi-fi setup, good speakers are powered from the mains, not from your PC.

For up-to-date PC reviews, see our August '96 cover story

•PCW Minimum specification

This is the absolute minimum spec we think you should even consider buying now. It's suitable for general business use: word processing, databases and spreadsheets and, with the addition of a modem, for accessing the internet.

- Windows 95
- 100MHz Pentium processor
- 16Mb RAM
- Graphics card with 1Mb of memory
- 810Mb hard disk
- 3.5in floppy disk drive
- Quad-speed CD-ROM drive
- 14in colour monitor
- PCI local bus

•PCW Recommended specification

If you're not completely strapped for cash, this is the PC specification we recommend. No-one who works at *PCW* would settle for less.

- Windows 95
- Pentium 133MHz processor (a fast processor will make your computer run more quickly and smoothly)
- 256Kb secondary cache (again this makes your computer run faster)
- 32Mb EDO RAM. 32Mb of memory speeds your PC up a lot, particularly if you're multitasking (using more than one application simultaneously)
- Graphics card with 2Mb of memory
- 2Gb hard disk — modern computer software takes up a lot of space
- 3.5in floppy disk drive
- Six-speed CD-ROM drive (video clips will play more smoothly; you will be able to access files on CD-ROM disks more quickly)
- 15in colour monitor (significantly easier on the eyes than a 14in version)
- 16-bit SoundBlaster-compatible sound card
- Speakers
- PCI local bus

•PCW Best Specification

Our Best Spec is as good a PC as you are likely to need for most software. For some specialist applications, like professional DTP or CAD, you may need to add even more memory, a bigger hard disk, a more powerful graphics card, or a larger monitor.

- Windows 95 or Windows NT4.0
- Pentium 200MHz
- 512Kb secondary cache
- 32Mb EDO memory
- 4Gb hard disk
- 3.5in floppy disk drive
- Eight-speed CD-ROM drive
- 17in colour monitor
- 4Mb VRAM or WRAM graphics card (this means your graphics card can display more colours and a higher resolution on your monitor: 16 million colours at a resolution of up to 1,280 x 1,024
- 16-bit wavetable soundcard
- Quality speakers
- PCI local bus

Buying a **Notebook**

Notebooks are one area in which it's often safer to stick to brand names. Not that some of the Far Eastern kit doesn't work perfectly well, but reliability seems to be a problem and it can be fiendishly difficult to obtain spares. A useful guideline when choosing a notebook is: try before you buy.

Remember that standard notebook specifications are generally a step or two behind the desktop equivalents.

What to look for in a notebook

- **Pointing device** There's been a wholesale move from trackballs to trackpads. Some notebooks, notably IBM Thinkpads, use stick technology (a device which looks like the rubber on top of a pencil and is controlled using one finger).
- **CD-ROM drives** are rapidly becoming standard in notebooks. If your notebook is going to be your only machine, it's worth getting one.
- **Floppy disk drive** Often there's a choice between a CD-ROM drive and a floppy disk drive. Again, if the notebook is to be your only machine, specify both. Otherwise, reinstalling an operating system can mean returning the machine to the manufacturer.
- **PC Cards** Modern notebooks all have at least one PC Card slot. They take credit-card sized expansion cards which can add a fax-modem, a network interface card or even an extra hard disk to your computer.
- **Battery life** Battery life varies from as little as 30 minutes to over six hours. Lithium Ion and Nickel Metal Hydride batteries have now replaced the older NiCad (Nickel Cadmium) batteries.
- **TFT screens** TFT or active matrix screens are replacing the slower dual-scan or passive matrix screens. It means the screen image is refreshed much more quickly.
- **Warranty** Drop a notebook and it may break, so it is vital to check the terms of your warranty. How long is it? What level of service is provided?

•PCW Minimum specification

Notebooks change rapidly. It's often possible to pick up end-of-line machines with 486 processors from brand-name manufacturers such as Toshiba and Compaq at discounted prices of £1,000 or less. These can be a very good buy. Just make sure they can run the software you need to use.

•PCW Recommended

- Windows 95
- Pentium
- Quad-speed CD-ROM drive
- 256Kb secondary cache
- 32Mb RAM
- On-board graphics with 1Mb of memory, PCI local bus
- 850Mb hard disk; 3.5in floppy disk drive and/or dual-speed CD-ROM drive
- TFT 800 x 600 screen

•PCW Best Specification

The state-of-the-art notebook. You're either loaded, or your company's picking up the tab.

- Windows 95 or Windows 3.11
- Pentium
- 256Kb secondary cache
- 16Mb RAM
- On-board graphics with 2Mb of VRAM memory, PCI local bus
- 1.2Gb hard disk
- 3.5in floppy disk drive
- Quad-speed CD-ROM drive
- Active matrix 1024 x 768 TFT screen
- Long battery life

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Glossary of Computing: **Important terms and acronyms**

A

Access Time
The time it takes for a device to access data. The access time, quoted in milliseconds (ms) for hard disks and nanoseconds (ns) for memory, is usually an average, as it can vary greatly. Together with the transfer rate, it is used to gauge the performance of hard disks and other devices. The lower the number, the better the performance.

Acronyms
These form most of the technobabble which has been refined over many years to confuse you, the user, and keep us, the writers, in business. Take as little notice of it as possible: the computer industry is littered with TLAs (Three-Letter Acronyms).

Applications
An application, or package, is one or more programs used for a particular task: for example, word processing, invoicing or spreadsheeting. Applications are bought shrink-wrapped (wrapped in cellophane for general use) or custom-built for more specific uses.

ASCII (American Standard Code for Information Interchange)
Usually a synonym for plain text without any formatting (for example: italics, bold or hidden text). Since computers naturally use binary rather than Roman characters, text has to be converted into binary in order for the processor to understand it. ASCII assigns binary values to Roman characters. RTF, a Microsoft standard, adds extra formatting features to plain ASCII.

B

Backwards compatible
Compatibility of hardware or software to older versions of the product or standard.

Baud rate
The amount of data that can be sent along a communications channel every second. In common usage, it is often confused with bits per second. These days modem speeds are normally measured in bits per second. (See V* and Bit).

BIOS
Basic Input/Output System. Software routines that let your computer address other devices like the keyboard, monitor and disk drives.

Bit
Binary digit, the basic binary unit for storing data. It can either be O or 1. A Kilobit (kbit) is 210 (1,024 bits); and a Megabit is 220, which is just over a million bits. These units are often used for data transmission. For data storage, Megabytes are more generally used. A Megabyte (Mb) is 1,024 kilobytes (Kb) and a Kb is 1,024 bytes. A Gigabyte (Gb) is 1,024Mb. A byte (binary digit eight) is composed of eight bits.

Bug (See Crash)

Boot
Short for bootstrap. Refers to the process when a computer loads its operating system into memory. Reboot means to restart your computer after a crash, either with a warm reboot (where you press Ctrl Alt Del) or a cold reboot, where you switch the computer off and back on again.

Bus
A "data highway", which transports data from the processor to whatever component it wants to talk to. There are many different kinds of bus, including ISA, EISA, MCA, and local bus (PCI and VL-bus).

C

Cache (See Memory)

COAST
Cache On A Stick.

CD-ROM
A CD-ROM is the same as a normal audio CD, except it can store data as well as sounds. A CD-ROM player can be attached to your computer to read information from the CD-ROM into the computer's memory in the same way that a domestic CD player reads information from the CD into your hi-fi. The advantage of distributing information on CD-ROM rather than other media is that each one can hold up to 680Mb of data — equivalent to some 485 high-density 3.5in floppy disks. The disadvantage, however, is that you can only write once on CD-ROMs, but this makes them ideal for archiving.

CISC (See **RISC**)

CPU
Central processing unit. Normally refers to the main processor or chip inside a PC. (See Processor).

Crash
Common term for when your computer freezes. Can be caused by a power surge, a bug (which is a fault in software), or a GPF.

D

DRAM (See Memory)

DOS (Disk Operating System)
Once the standard operating system for PCs, it is now being replaced by Windows 95 and Windows NT.

DPI (Dots Per Inch)
Common measure of the resolution on a printer, a scanner or a display.

Drive controller card
An expansion card that interprets commands between the processor and the disk drives.

Drivers
Pieces of software that "drive" a peripheral. They interpret between the computer and a device such as a CD-ROM. If you have a SCSI CD-ROM drive connected, you will be able to use it on a PC or a Mac just by loading up the relevant driver on each machine.

E

EIDE (See IDE)

EISA (Extended Industry Standard Architecture)
A bus standard designed to compete with MCA. Now being replaced by PCI.

Electronic mail (E-mail, email)
Still the biggest single use of the internet. When you sign up with an ISP you are given an email address. Usually you can incorporate your name, or part of it, into your email address to make it easy to remember.

Expansion card
Circuit boards that fit inside PCs to provide extra functionality. For example, one might be an internal modem, providing the same functions as an external one (which is more common) but sitting inside the PC. Expansion cards are designed to be fitted and removed by people with little knowledge of PCs.

F

Floppy disk drive
Practically all PCs come with a floppy disk drive. 3.5in HD (high density) 1.44Mb floppy disks are now the standard. They come in hard plastic cases and have replaced the older, literally floppy 5.25in disks.

Fonts
A font is an alphabet designed in a particular style. Fonts apply to both screen and printed letters. TrueType and Type 1 fonts are stored as shape descriptions, scalable to any size.

Format
To wipe a floppy or hard disk in order to prepare it to accept data.

G

GPF
General protection fault.

Graphics Card
An expansion card that interprets commands from the processor to the monitor. If you want a better, higher-resolution picture or more than your existing setup, you'll need to change your graphics card and/or your monitor.

GUI (Graphical User Interface)
(See Windows)

H

Hard disk
Sometimes called a fixed disk, hard disks are hermetically-sealed rigid disks able to store data and programs. Disk capacities increase all the time. The standard is now 1Gb, but disks of up to 9Gb are available.

Hardware
All electronic components of a computer system, including peripherals, circuit boards and input/output devices.

HTML (Hypertext mark-up language)
The standard language used in the creation of web pages.

I

IBM-compatible
Originally meant any PC compatible with DOS. Now tends to mean any PC with an Intel or compatible processor capable of running DOS or Windows.

IDE
Integrated drive electronics. A control system designed to allow computer and device to communicate. Once the standard for PC hard disks, now being replaced by EIDE (enhanced IDE) which offers improved performance and extra features.

INTERNET
Millions of computers interconnected in a global network.

INTERNET SERVICE PROVIDER
ISPs provide access to the internet. You use your modem to dial the ISP's modem. The ISP has a high-bandwidth permanent connection to the internet.

IRDA
Infra-Red Data Association — standard for exchanging data using infra-red, typically from PDAs or notebooks to a PC or printer.

ISA (Industry Standard Architecture)
This was the original bus architecture on 286 PCs. Also known as the AT bus (the 286 was known as the AT), it is still in use today. Slow by modern standards, but so widely accepted that expansion cards are still made for it. (See EISA, PCI).

ISDN Integrated Services Digital Network
A digital voice and data telephone network which looks set to replace the current analogue one. ISDN adaptors are already starting to replace modems as a fast way of accessing the internet and transferring data.

J

JPEG (See MPEG)

K

Kbit (kilobit), Kb (kilobyte)
(See Bit)

L

LAN (Local Area Network)
(See Network)

Local Bus
PCI (Peripheral Component Interconnect), developed by Intel, is now the standard for local bus architecture. It is faster than the older VL-Bus (Video Electronic Standards Association local bus) it has now largely been replaced.

M

Macintosh (Mac)
A personal computer made by Apple and which is incompatible with PCs. Developed as a rival standard, its operating system looks like Windows, except that it predates it and (in many people's view) looks and works much better.

Maths co-processor
A specialised chip that handles mathematical calculations (floating point operations) for the processor. Modern processors such as the Pentium have a co-processor built into them.

Mbit (megabit) (See Bit)

Mb (Megabyte) (See Bit)

MCA
A type of bus designed by IBM to beat EISA. Although faster, it never became popular because every machine that used it had to pay a royalty to IBM, and because it was not backwards-compatible with ISA.

MPEG (Moving Picture Expert Group)
A standard for compressing video available in several flavours: MPEG 1, MPEG 2 and MPEG4. JPEG (Joint Photographic Expert Group) is a standard for still image compression.

Memory
The term normally refers to RAM (Random Access Memory). This is the kind that disappears when you turn off your computer and is much faster to access than a hard disk. It acts as a staging post between your computer's hard disk and its main processor.

- DRAM (Dynamic Random Access Memory)
This requires its contents to be replaced every 1/1000th of a second and is the most common form of memory in PCs.
- SRAM (StaticRAM)
Retains memory until the power is switched off.
- VRAM (VideoRAM)
Faster than DRAM, this is used by graphics cards.
- EDO (Extended Data Out RAM)
The latest type of memory, offers improved performance.

Cache memory
Temporary memory set aside to store the information that is accessed most frequently. The Pentium processor has 8Kb of inbuilt cache. This can be further speeded up by a secondary cache, typically 256Kb. Part of your DRAM is often used to cache your hard disk.

ROM (Read-Only Memory)
A type of memory which can only be read: you can't make changes to it as you can to RAM. It is commonly used for things that will never need to be changed, such as the information the computer requires when you start it up.

Modem
The word is a contracted version of "modulator/demodulator", which means that a modem is a box (or, less commonly, an expansion card) that lets your computer talk over phone lines to other computers.

Monitor
Your computer's screen. Signals are sent to it from the video card.

Motherboard
The main printed circuit board which houses processor, memory and other components.

N

Network
A network is a group of computers linked together with cable. The most common form is a LAN (Local Area Network), where electronic mail and other files can be exchanged between users without swapping floppy disks. Printers and other resources can be shared. All the PCs on a LAN are connected to one server, a powerful PC with a large hard disk that can be shared by everyone.

O

OS (Operating System)
The operating system communicates with the hardware and provides services and utilities to applications while they run, such as saving and retrieving files.

P

Package (See Application)

PC Card
Formerly PCMCIA. A standard to allow PCs, particularly notebooks, to be expanded using credit-card sized cards.

PDA (Personal Digital Assistant)
Small electronic organisers. The Psion 3a is a typical example.

PCI (See Local Bus)

PCMCIA (See PC Cards)

Parallel Ports
Used by your PC to communicate with the outside world, usually via a printer. Information can travel in parallel along a series of lines, making it faster than serial ports which can only handle one piece of information at a time.

Pixel
Picture element. The smallest possible addressable dot displayed on a monitor.

PowerPC
This family of RISC chips is the result of a collaboration between IBM, Apple and Motorola. It is now used in all Apple Macintosh computers and many IBM workstations.

Processor
The chip that does most of a computer's work.

Programs (See Applications)

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Public Domain
Software that is absolutely free. The author usually retains copyright but you can make as many copies as you want and pass them to other people. Public domain software often consists of small utilities which the author feels might be useful to other people. It is often confused with shareware.

Q

QWERTY
The name of a standard English-language keyboard, derived from the first six letters on the top row. The French equivalent is AZERTY.

R

RAM (Random Access Memory)
(See Memory)
Reboot
(see Boot)
RISC
Reduced Instruction Set Computing. These are starting to replace CISC (Complex Instruction Set Computing), as they are generally faster. The PowerPC chip is a typical example.
ROM (Read Only Memory) (See Memory)
RTF (Rich Text Format) (See ASCII)

S

SCSI
Small Computer System Interface is a bus that comes as standard in a Macintosh and is starting to rival EIDE on PCs.
Serial Port
The serial port, of which there are sometimes two (com1 and com2), is used by your PC to communicate with the outside world. Serial ports are predominantly used by modems and similar devices which communicate quite slowly. Some mice use them. Faster communications are achieved via the parallel port.
Shareware
A way of distributing software which is often used by smaller programmers rather than big software houses. It is freely available, but not free of charge. You are honour-bound to pay a small fee to the software's developer if you continue to use the program after a set period.
SIMM (Single Inline Memory Module)
The standard modules for memory expansion on PCs. Older 30-pin SIMMs have now been replaced by the 72-pin variety available in capacities up to 16Mb.

T

Tape Streamer
Magnetic tape recorder designed for backing up data from your hard disk.

U

UART (Universal Asynchronous Receiver Transmitter)
Pronounced you-art. A chip that allows your PC to cope with high-speed communications.
V34, V32bis
A series of CCITT standards that defines modem operations and error correction. There are over 20, but the key ones are:
• V32.bis, the standard for 14,400bps modems.
• V34, the new standard for 28,800bps modems (see Baud). Don't buy a modem that doesn't comply with one of these standards.
VESA (See Local Bus)
VGA
Video Graphics Array is the name given to a popular display. VGA graphics have 640 pixels horizontally and 480 vertically, and can display 16 colours. SuperVGA (SVGA) graphics can display 800 x 600 or 1,024 x 768 in as many colours as the memory in your graphics card will allow: up to 16.4 million, or true colour.
VL-Bus (See Local Bus)
VRAM (See Memory)

W

Windows
A GUI (Graphical User Interface) developed by Microsoft. Windows is supposed to make programs easier to use by giving them a standard, mouse-driven interface.
Windows 3.11 16-bit operating system.
Windows NT Robust, fully 32-bit operating system. Currently has the Windows 3.11 interface, but will soon be available with the Windows 95 interface.
Windows 95 Major improvement to Windows 3.11, with a redesigned interface. Less prone to crashes and easier to use, but requires more memory.
WINSOCK
Short for sockets for Windows. The Winsock.dll is an extension for Windows and is necessary for connecting to TCP/IP networks.
WORLD WIDE WEB
A service on the internet which uses special software called Web Browsers (Netscape and Internet Explorer are the two best known ones) to give you access to pages of information with text, pictures and multimedia.
WYSIWYG
An acronym for What You See Is What You Get. What you see on the screen is exactly what you get when you print out your work.

Z

ZIF (Zero Insertion Force)
Sockets used for large CPUs. Lifting a handle enables you to remove the processor.
ZIP
Better known as PKZIP, this is a widely-used shareware utility that compresses files so that they take up less room. You can tell when you have a zipped file as its name ends in ZIP. PKZIP is the most common form of this type of compression.

How to choose an ISP

There are now over 100 Internet Service Providers, which makes selecting the right one a difficult task. Competition between them is now so fierce that many Providers are happy to offer a month's free trial.

All ISPs (Information Service Providers) allow you to send and receive internet email, browse the web and download files from internet servers. But there are differences between the extra services that each provides.

Large, centralised, online services such as AOL and CompuServe offer discussion areas and specialised content like online magazines and easily-searchable file libraries. Some providers allow you one email address per account while others offer you as many as five. Some charge a flat-rate for internet access while others charge extra if you exceed a specified number of hours online.

The quality of the software and technical support provided also varies. In general, the big "consumer" ISPs offer better support and more commercial software. The smaller, more basic, operations often offer cheaper deals.

Some ISPs are more geared up to business users who may need a fast ISDN connection and/or require the service provider to host or even design web pages for them.

Your chosen ISP can have a big effect on the performance of your internet connection, particularly in terms of access speed to US sites. Few ISPs provide local call access to anywhere in the UK. In London you'll have plenty of choice, but in the west of Scotland, say, the choice will be limited.

•PCW Recommended Products

Big, commercial ISPs. Not cheap, but easy to use, with plenty of extra services thrown in.

CompuServe 0800 289378

AOL 0171 385 9404: Barebones service that's not for beginners but does make your PC a full internet node in its own right.

Demon 0181 371 1000: Another established service provider worth considering.

Easynet 0171 209 0990

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Buying a **Printer**

There are two main types of printer: laser and inkjet.

■ Lasers

Most office printers are lasers. They work pretty much like photocopiers, and are cheap to run and print quickly. Their disadvantage is higher initial cost and mono output. Laser printers are available in all sizes and at all prices. Small desktop printers cost as little as £300. You can buy colour laser printers but they are still expensive, typically £5,000 or more.

■ Types of laser

PCs print by sending a description of the page to be printed down a printer cable.

There are three commonly-used page description languages (PDLs):

• PostScript

This sends an outline in vector form (*see "Drawing Software"*) to the printer where it is rasterised (converted into dots) and printed to the device's best ability. PostScript is device-independent so that the image looks the same on a monitor (75dpi), a laser printer (300dpi) or a professional image-setter (2400dpi).

• PCL

This stands for Printer Control Language, and it is Hewlett-Packard's alternative to PostScript, licensed to many clone-printer manufacturers. Printers using this tend to be cheaper than PostScript ones but output will vary from one machine to another, making it less suited to professional use.

• GDI (graphical device interface)

These printers download the description of your page already used by Windows straight to your printer. They will only work with Windows but are cheap and fast. They are also only suitable for a personal printer and will not work across a network.

•PCW Recommended Products

CHEAP LASERS Epson EPL-5500: **Epson 0800 220546**; street price £300 (see *PCW* February '96)

SUB-£750 LASERS Hewlett-Packard 5P: **Hewlett-Packard 01344 369222** (see *PCW* November '95)

NETWORK LASERS Hewlett-Packard 5P: **Hewlett-Packard 01344 369222** (see *PCW* February '96)

■ Inkjets

Inkjets work by spraying ink onto paper. There are still some mono inkjet printers available, but it's best to stick with a colour inkjet printer as the price difference is negligible. They are cheap to buy but more expensive to run, and slower. Even cheap inkjets can print in good quality colour, especially on high-resolution paper.

•PCW Recommended Products

HP Deskjet 870CXi: **HP 0990 474747;** street price £311.

Lexmark 2070: **Lexmark 01628 481500;** street price £280. (See *PCW* November 1996).

■ Hybrids

For home use and small offices a hybrid could be the answer. They combine a printer, a fax machine and copying capability in one unit.

•PCW Recommended Products

Hewlett-Packard OfficeJet LX: **HP 01344 369222;** street price £499 (see *PCW* December '95)

Buying a **Scanner**

Scanners are used to import text, graphics or pictures into a PC. They vary from low-cost hand scanners not much bigger than a mouse, to drum scanners costing thousands of pounds. The latter are designed to scan photographic transparencies to professional standards.

■ Flatbed scanners

The most common type of scanner. They range in price from £300 to over £3,000. They are capable of scanning colour pictures to a high standard. Most have transparency adaptors as an optional extras.

■ Document scanners

A new category which aims to combine the reliability of flatbeds with speed and portability. They're intended for OCR and document management. Most will cope with photographs and some with colour, but it's not their forté.

p338 ➢

•PCW Recommended Products

Flatbed Scanners

Professional — Arcus II: **Agfa 0181 231 4200;** street price £2,600.

Intermediate — Epson GTX 9000: **Epson UK 01442 61144;** street price £750.

Budget — Umax Vista S6E: **IMC 01344 872800;** street price £299 (*PCW*, Sept '96).

•PCW Recommended Products

Document Scanners

Visioneer PaperPort VX: **Computers Unlimited 0181 200 8282;** street price £299.

Logitech PageScan Colour: **Logitech 01344 894300**; street price £299.

Plustek PageReader 800: **Scan Direct 01292 671676;** street price £149 (*PCW*, March '96).

Buying a **Fax Modem**

You'll need a modem to connect to the internet or an online service such as CompuServe or AOL, and also to send and receive email.

Modems are available in three formats: as PC cards to plug into notebooks, as external boxes, and as expansion cards. PC card modems cost the most and external modems cost slightly more than the expansion card variety.

Apart from the case and the external power supply, there's often little difference between the internal and external versions of a modem. Most modems now have fax capability built in, which means you can receive faxes on your PC to view or print out. If you're strapped for cash, a V32bis 14,400Kbits/sec modem is adequate. However, prices have now fallen so rapidly that a V34 28,800Kbits/sec modem is probably a better bet.

•PCW Recommended Products

Fax-modems

External — Motorola 3400 Online: **Motorola 01923 404343;** street price £160 (see *PCW* February '96)

Buying a **CD-ROM Drive**

Just about the only things which differ on today's CD-ROM drives are their speed and means of connection. The most common connection is IDE or Enhanced IDE (EIDE). It is possible to connect an IDE CD-ROM drive to most existing IDE hard disk controllers. Older PCs may need a newer EIDE controller. IDE controllers are also found on many soundcards.

The first CD-ROM drives spun the disc at the same speed as an audio CD and were called single-speed, delivering a sustained data transfer rate of 150Kb/sec. Double-speed drives spun twice as fast, doubling the data transfer to 300Kb/sec, and quad-speeds twice as fast again, raising the transfer rate to 600Kb/sec.

Six-speeds are currently the standard (900Kb/sec), with eight-speeds (1200Kb/sec) becoming increasingly common. All figures are theoretical maximums. Buyers should go for quad-speed or higher. There is little to choose between models, but off-the-shelf supplies are frequently short. Internal IDE quads start at around £100 and six-speeds around £130.

•PCW Recommended Products

CD-ROM Drives

• Teac CD56-E six-speed: fitted to many new PCs and costing around £85 (*PCW* January '96).

• The Goldstar 8X is a good 8-speed choice for around £99 (*PCW* Aug '96).

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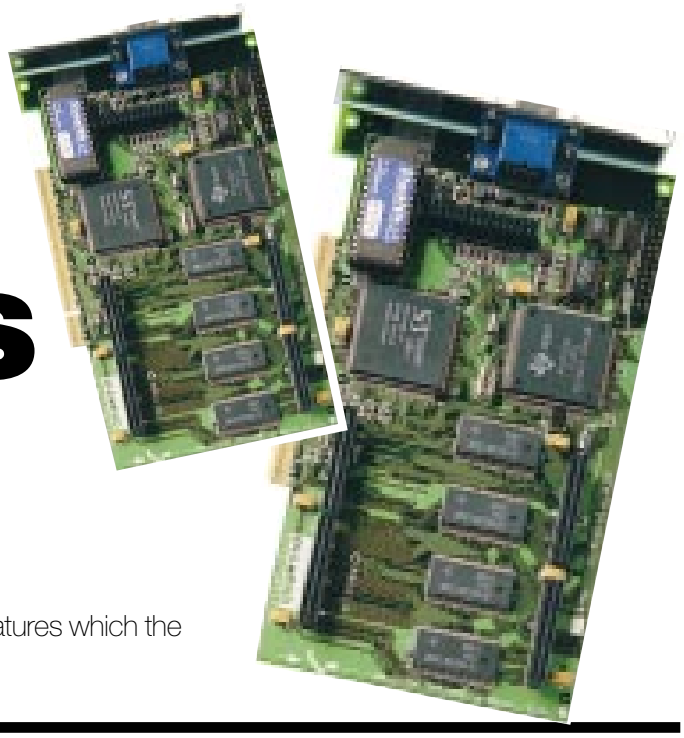
Buying a **Graphics Card**



The graphics card sits inside the PC and controls the features which the software can display on the monitor.

Check the amount of memory on the card. 2Mb is about standard these days, 1Mb is skimpy and 512Kb is barely usable. Better-quality cards are likely to be fitted with VRAM (Video RAM). Also, check out the performance capability of the card. Video cards come as 16-bit, 32-bit, 64-bit and even 128-bit: all you need to know is that a large number of bits means faster performance and more colours.

The most important aspect of your video card, and the most frequently quoted feature, relates to the resolution which the card supports in Windows. This is measured in terms of the number of pixels that the card displays on screen. The absolute minimum these days is 1,024 x 768 with a refresh rate of 70Hz.

A 2Mb card can display 16-bit colour (65,000 colours) at 1,024 x 768 pixels. A 1Mb card can only manage 8-bit colour (256 colours) at 1,024 x 768 pixels. To display 24-bit colour (16 million colours) at 1,024 x 768 you'll need 4Mb of memory.

The refresh rate (measured in Hertz) is important, too. It represents the number of frames displayed on-screen, per second. A flickering display is very tiring to use.

Finally, find out whether your video card is "local bus" or not. "Local bus" is a type of interface which connects your video card to the motherboard. It allows the memory in the card to be addressed directly by the CPU which makes it a lot faster than the standard ISA (Industry Standard Architecture) interface.

• PCW Recommended Products

Graphics Cards

ATI Video Xpression: **ATI Technologies 01235 833666;**around £175 (see Graphics Card group test, PCW June '96)

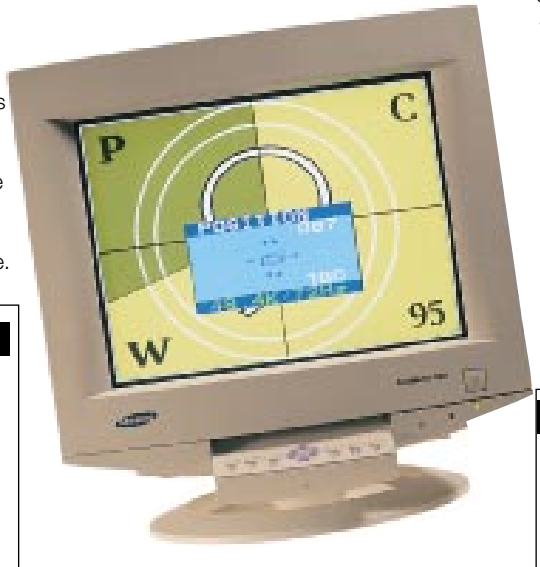
Diamond Stealth 64 VRAM: **Diamond 01753 501400;** from around £190

VideoLogic GrafixStar 400:**VideoLogic 01923 260511**from about £115

Buying a **Monitor**

Regardless of your computer application, you'll be looking at your monitor all day, so make sure you get a good one.

Some people claim not to see monitor flicker, but your brain will, resulting in fatigue and headaches. A refresh rate of 70Hz or higher will produce a flicker-free image on most monitors.



Interlacing also results in flicker. Always run in non-interlaced modes and ignore interlaced quotes.

The resolution refers to the number of dots (pixels) horizontally and vertically on-screen. Standard VGA mode runs at 640 x 480 pixels, while other typical modes include 800 x 600 and 1,024 x 768. The more pixels, the more you'll be able to fit on screen, but everything will be smaller and may only be suitable on a larger screen. Go for a 15in or 17in monitor capable of running a resolution of 1,024 x 768 non-interlaced at 70Hz or higher. The visible area of most monitors (and TVs for that matter) is smaller than the model implies: a 15in screen may only have a 14.5in visible area, and a 17in only 16in visible.

• PCW Recommended Products

For a 15in screen, try the CTX 1569MS (around £300) or the NEC M500 multimedia (around £410 on the street). At 17ins there's the Sony 17sfII or the Taxan Ergovision 730TCO-S at around £500 (*PCW* July '96).

p342 ➢

Buying a **Sound Card**

You need one of these to add sound capability to your PC.

Check compatibility with your CD-ROM drive, and remember that 16-bit cards capable of 44KHz provide higher-quality sound than slower 8-bit cards. Better soundcards now include wavetable synthesis which means they have samples of real instruments held in ROM.

The quality of wavetable synthesis still varies widely. Even cheap cards which have the inferior Frequency Modulation synthesis should have a daughterboard connector allowing them to be upgraded to wavetable.

The newer cards are also plug and play which means, in theory, that you should be able to plug them straight into a PC without any extra configuration. Most cards are bundled with extra software, normally sequencers, wave editors and audio players.

PCW Recommended products

AWE-32: **Creative Labs 01245 265265;** £199 (*PCW,* April '96)

Aztech SoundGalaxy Waverider Pro: **Aztech 01734 814121;** £79 (*PCW,* April '96)

Buying **Software**

Only a few years ago there were dozens of different software applications in each category. During the last two years or so, however, there has been rapid product consolidation. Other magazines list large numbers of packages, most of which are out of date and are not worth considering. We've distilled each category down to just one or two recommended products.

Software A-Z

A

■ ACCOUNTS SOFTWARE One of the few categories in which there are still masses of packages on the market at a huge range of different prices. Accounts is also one of the last bastions of DOS.
Recommended products: Lakeview LMS and Exchequor from SBS Systems.

C

■ CAD SOFTWARE Computer Aided Design covers everything from architectural drawings through office planning to complex engineering drawings.
Recommended products: AutoCAD, now at release 13, is still the industry standard. However, it's expensive and complex. For the casual user, Drafix QuickCAD is a cheap and accessible way to try your hand at it.

■ CONTACT MANAGERS (see PIMs)

D

■ DATABASE At its simplest, an electronic card index. For just a few hundred names and addresses, an electronic Filofax such as Lotus Organizer may be more appropriate. But for more sophisticated applications like tracking products and customers, the power of a relational database is required. Databases are generally the least user-friendly of the main suite applications. In most office environments you're more likely to use a database application that somebody else has written for you.
Recommended products: Lotus Approach, Microsoft Access.

■ DRAWING SOFTWARE Programs for drawing that work using vectors. This means each shape drawn is described using mathematical equations.
Recommended products: At the budget end, GSP Designworks 3 stands out. At the professional end of things it's FreeHand 5 which gets our plaudits.

I

■ IMAGE EDITING SOFTWARE A program for editing bitmap files (files made up of pixels). Typically used for converting graphics files, retouching photographs and preparing pictures for printing.
Recommended product: For simple image editing the popular shareware program Paintshop Pro is fine. For professionals, Adobe's Photoshop is the industry standard.

■ INTEGRATED PACKAGES Typically these combine the functionality of a database, word processor and spreadsheet in one application. This makes it easy to move data from one component to another, but integrated packages tend to lack some of the advanced features of individual applications in the Suites.
Recommended product: Microsoft Works.

O

■ OCR SOFTWARE Optical Character Recognition software converts printed text into computer text you can edit. You will also need a scanner or fax card to get the printed text onto your PC. OCR saves re-keying documents and can cut down drastically on paper filing systems.
Recommended products: Omnipage is the best product we have found, but TextBridge offers most of the same capabilities for less cash.

P

■ PERSONAL INFORMATION MANAGERS (PIMs) PIMs are an electronic way of storing names, addresses, phone numbers and appointments. Contact managers take the idea one step further to include business information about dealings with clients.
Recommended products: Sidekick 95 and Organizer are excellent PIMs. For contact managers we recommend Goldmine for Windows.

■ PRESENTATION GRAPHICS Increasingly the trend is towards doing presentations on a PC and the latest packages tackle this by including sound, sophisticated transitions between slides and support for video clips.
Recommended products: Powerpoint and FreeHand are both capable products that are sold with Microsoft Office and SmartSuite respectively.

■ PROGRAMMING TOOLS Applications designed for writing software. These range from "low-level" languages which are powerful but difficult to learn and use, to "high-level" languages which, although much easier to use, generally sacrifice performance and flexibility in the process.
Recommended products: Delphi 2.0 is a great example of scalability, catering for beginners and serious developers working on major projects. Visual C++ is the pick of the high-end Windows development tools.

■ PERSONAL FINANCE PACKAGES These help you manage home finances. They're also well suited to some small businesses and tend to be easier to use than full-blown accounts packages.
Recommended products: Quicken is the outstanding product in this category and has no serious rivals.

R

■ REMOTE CONTROL SOFTWARE Software which lets you access and control a PC remotely, usually by using a modem.
Recommended products: ReachOut, for its simple interface and support for different networks, particularly TCP/IP.

S

■ SPREADSHEET An electronic version of an old-fashioned ledger. Ideally suited for balance sheets and sales figures. Excellent graphing and charting facilities are included nowadays.
Recommended products: Lotus 1-2-3, Microsoft Excel.

■ SUITES These days, most general business software (word processors, spreadsheets, presentation graphics packages) is sold in suites. Two suites are widely available: Lotus SmartSuite and Microsoft Office. If you buy them bundled with a new PC, they can cost £100 or less. Bought separately, they cost between £200 and £300. Lotus SmartSuite also contains a database. For Microsoft Office, you pay extra for Office Professional which contains Microsoft's Access database.
Recommended products: Microsoft Office is now close to the industry standard. Its high level of integration gives it the edge over the opposition.

V

VISUAL PROGRAMMING (see Programming Tools).

W

WORD PROCESSOR An application in which you write letters and reports or even produce a simple newsletter. The latest word processors have advanced features such as outliners, table editors and facilities for adding up columns of figures.
Recommended products: Microsoft Word is the clear market leader. WordPro (formerly AmiPro) is a capable alternative.

A-Z of Recommended Software Products

	Category	Product	Supplier	Contact	Price (Excl. VAT)	Date of PCW review
A	Accounts	Lakeview LM3	Lakeview Computers	0181 303 3329	£8,750	Jan-96
	Accounts	Exchequor	SBS Financial Systems	01202 298008	£5,980	Jan-96
C	CAD	AutoCad Release 13	Autodesk UK	01483 303 322	£3,150	Oct-95
	CAD	Drafix Quick CAD	Roderick Manhattan	0181 875 4400	£69	Oct-95
D	Database	Approach	Lotus	01784 455445	£99	Nov-96
	Database	Access	Microsoft	01734 270001	£220	Feb-96
	Drawing	Freehand 5	MacroMedia	01344 761111	£450	Apr-96
	Drawing	Designworks 3	GSP	01480 496789	£39.95	Apr-96
I	Image Editing	Photoshop	Adobe	0181 606 4000	£382	Apr-95
	Image Editing	Paintshop Pro	Digital Workshop	01295 258335	£49.95	Jun-95
	Integrated Package	Works	Microsoft	01734 270001	£79.99	Oct-95
O	OCR	Omnipage	Caere	0171 630 5586	£595	Nov-95
	OCR	Textbridge	Xerox Imaging Systems	01734 668421	£349	Nov-95
P	Personal Finance	Quicken	Intuit	0800 585058	£39.95 (Incl. VAT)	May-96
	PIM/contact manager	Organizer 2.1	Lotus	01784 455445	£99	Mar-96
	PIM/contact manager	Goldmine for Windows	Elan Software	0171 454 1790	£395	Mar-96
	PIM/contact manager	Sidekick 95	Starfish UK	0181 875 4400	£39	Mar-96
	Presentation graphics	Freelance	Lotus	01784 455445	£415	Nov-96
	Presentation graphics	Powerpoint	Microsoft	01734 270001	£220	Nov-96
	Programming tools	Visual C++	Microsoft	01734 270001	£379	Feb-96
	Programming tools	Delphi 2.0	Borland	01734 320022	249	Feb-96
R	Remote Control	Reachout	Stac Electronics	01483 740763	£110	Nov-95
S	Spreadsheet	Excel	Microsoft	01734 270001	£220	May-95
	Spreadsheet	1-2-3	Lotus	01784 455445	£365	May-95
	Suite	Office (Standard)	Microsoft	01734 270001	£360	Mar-96
	Suite	Office (Professional)	Microsoft	01734 270001	£460	Mar-96
W	Word Processing	Word	Microsoft	01734 270001	£220	Oct-96
	Word Processing	WordPro (AmiPro)	Lotus	01784 455445	£99	Oct-96

News

In gear for the Grand Prix

Fans of the Grand Prix need not go unchallenged as the season draws to a close. Geoff Crammond's recently-released motor racing simulation, Grand Prix 2, is shooting up the games charts after three years in development. Grand Prix Manager 2, from Microprose, is the follow-up. It's a strategy management game, where you control all aspects of managing and developing the ultimate racing team through a ten-season campaign. You'll have to negotiate for the best drivers, test the best engines and raise sponsorship for your team. The game features 1996 Formula One season data, giving rules, photos, circuits, drivers and stats.

Another Grand Prix racing, business and management sim is F1 Manager from Europress. It's been developed by Software 2000, a German management-sim company, and has been endorsed by the Formula One Constructors Association.

Microprose
01454 893893
Europress
01625 859333

Hire and fire the best drivers in Grand Prix Manager 2

ECTS

ECTS Autumn 96, the games and multimedia trade extravaganza, will be covered in *PCW* next month.

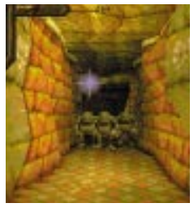
Hot off the press

Scorched Planet is Criterion Studios' first 3D action strategy game and will be available this month, priced at £39.99 RRP. Set in the year 2230 in a remote colony world called Dator 5, you play the part of a down-and-out fighter pilot. You are the colonist's last hope to save the planet from the vicious and merciless Voraxians, creatures which include pterodactyls, giant lizards, spiders, mammoths and yetis.

The 3D games subsidiary of Criterion Software has another two titles lined up: an underwater strategy adventure game called Sub-Culture, and Aqua'Tak, a powerboat racing game where you have a handy arsenal of high-tech weaponry on board. Both are due for release in early 1996.

Virgin Interactive Entertainment
01373 453888

Dungeons, detonations and deities



Bullfrog's Dungeon Keeper is receiving its final touches and should be ready for release this month.

Meanwhile, Syndicate Wars, the sequel to the action strategy game Syndicate, has been released after three years in development. It features a fully-rotatable landscape, and intricately-mapped cities with full light sourcing. Bullfrog claims the game includes "some of the most awesome explosions ever to be seen on a computer screen".

Also available now is Gene Wars, a strategy and play-God game, which is apparently styled like the classic fifties B movie.

Electronic Arts 01753 549442

Charts

Interactive Leisure Level One

1	Quake	GT Interactive	PC CD-ROM
2	Resident Evil	Virgin	PlayStation
3	Bust a Move 2: The Arcade	Acclaim	PlayStation
4	Z	Virgin	PC CD-ROM
5	Formula One Grand Prix 2	Microprose	PC CD-ROM
6	Destruction Derby	Sega	Saturn
7	Athlete Kings	Sega	Saturn
8	Championship Manager 2	Domark	PC CD-ROM
9	Theme Park Classics	EA	PC CD-ROM
10	Alien Trilogy	Acclaim	PlayStation
11	Little Big Adventure Classics	EA	PC CD-ROM
12	Command and Conquer	Virgin	PC CD-ROM
13	Ridge Racer Revolution	Namco	PlayStation
14	Civilization 2	Microprose	PC CD-ROM
15	Syndicate Classics	EA	PC CD-ROM
16	Worms	Sega	Megadrive
17	Warcraft 2	Ablac	PC CD-ROM
18	Magic Carpet Classics	EA	PC CD-ROM
19	Day of the Tentacle: White Label	Virgin	PC CD-ROM
20	Bioforge Classics	EA	PC CD-ROM

Z (yes, that's it, folks!)

A riot of robots help you to take territory and blast bad guys.

The Bitmap Brothers know a thing or two when it comes to making great games. With a succession of hits behind them (Xenon2, Cadaver, and Magic Pockets being just some) their latest game, Z, is sure to sell well.

The gameplay is along the lines of Command and Conquer. There is, however, one huge difference: Z has barrels of humour, both in the game and throughout the full motion video (FMV) sequences between each level.

The object is to annihilate the bad guys and capture their fortress while carefully defending your own. Each game, or battlefield, is divided into territories which both sides fight to occupy.

To begin with, you have one territory where your fort is located, and up to ten robots with which to fight. You allocate the robots missions by clicking on them and directing them to, say, an abandoned tank. Once the tank is in your possession, it can be sent to capture and defend a new territory.

Within each territory is a manufacturing plant where you can make tanks, jeeps — you name it. If you're in control of that territory you get the finished product, fully armed, along with your very own loyal robot.

There are several types of robots (clever ones, pretty hard ones, wimps and psychopaths) and it's up to you which type you send on each mission. As each game progresses, robots develop some intelligence. If they're under attack, they'll let you know, and if there's ammunition nearby, they'll go all out to get it.

There are plenty of interesting weapons to pick up along the way, ranging from gatling-guns to rocket launchers, and the explosions are pretty impressive. You'll need to be a strategic thinker to win the game, though — you can't just send in the troops and hope for the best.

Z is infuriatingly addictive. If you manage to finish the game yourself, you can go on to fight against others using the network and modem options.

Z is the best game I've played this year (so far). And yes, I have seen Quake and Duke Nukem.

Steven Helstrip

Colourful graphics, great full-motion video sequences, tough battlefield engagements and some light-hearted humour make Z a blast to play

•PCW Details

Price £44.99 (incl. VAT)
Contact Warner Interactive 0171 391 4300
System Requirements 486DX/66 with 8Mb RAM, DOS 5 (runs under Windows 95), 20Mb disk space, mouse, CD-ROM.
★★★★★

p514 ➢

The Need for Speed
Special Edition

Jump into your super-car and give it some wellie.

This is an updated and improved version of a game released late last year. Essentially it's a driving game, but the cars on offer are exotic, to say the least. Beginning with a Mazda RX-7, you next get the chance to try out a Toyota Supra Turbo, a Ferrari 512TR and even the Batmobile-like Dodge Viper RT/10.

You can choose from different tracks, each with its own quirks, and there are several types of race. Head to Head, for instance, pitches you against a single opponent, whereas Tournament places you in a multi-race championship with several other cars. There is now a network play option, too.

But it's at street level where the game really shines. With all the graphics options set to maximum it's is a visual extravaganza, but you'll need a fast system to make everything run smoothly. Although you can watch things from outside the car, things look best from behind the windscreen, with the steering wheel jiggling about in front of you.

Realistic simulations make applying the handbrake a dangerous manoeuvre

The physics model has been improved, to make the cars behave more realistically, and when they're being driven the difference is readily apparent. But although the cars' handling characteristics are realistic, the game falls short of being a complete simulation. This is most noticeable when your vehicle leaves the road: losing control at 170mph is remarkably unspectacular, and although it's possible to roll a car, it could hardly be described as a stupendous event. Never mind; you can drive round the tracks backwards, and it's great fun to apply the hand-brake and watch the car spinning wildly on the tarmac, leaving strips of smoking rubber in its wake.

Julian Prokaza

PCW Details

Price £44.99 (incl. VAT)

Contact Electronic Arts 01753 549442

System Requirements Pentium 75 or higher, 8Mb RAM and 4Mb hard disk space (DOS), 12Mb RAM and 30Mb hard disk space (Windows 95), VESA-compatible video card, 2x CD-ROM drive, sound card.

★★★★

Baku Baku Animal

Wacko, wacko zoo-keeping with a twist.

You played it when it first came out as a little black-and-white game. You loved it, but it got boring. Then you played it on big machines, or in 3D and 4D versions. You got *really* good at it and then you got bored again. Now, you can get re-addicted.

Tetris is back in the guise of Baku Baku Animal, a marvellous little Sega product. The aim is to be the best zoo keeper in the world. No strange shapes (like Tetris) to improve your spatial awareness here, just little boxes. But boxes with a difference. Some are monkeys, some are pandas, others are bamboo or bananas. All you have to do is feed the animals their favourite foods. They munch happily away and reduce your pile of blocks. If you're particularly unco-ordinated, the hungry little dogs at the bottom of the pile will sob.

You'll need to feed these hungry critters or you may end up being lunch yourself!

The music is the closest I've come to being in arcade hell but it doesn't bother you when you're playing. The graphics are sharp and fun and you can play against the computer, a friend, or test yourself.

The most wicked aspect of the game is that you can get well and truly dumped on. The better the player, the worse it is for their opponent: a whole wildlife park can be dropped onto your pile with very little warning. The only problem is the cost, as this type of game is usually free, on shareware. And you know what will happen… you'll get bored.

Janice Murray

PCW Details

Price £29.99 (incl.VAT)

Contact Sega (Europe) 0181 995 3399

System Requirements 75MHz Pentium, 8Mb RAM, 5Mb disk space, SVGA monitor, 16-bit sound card, 2x CD-ROM.

★★★

Upwardly mobile

Yuppies weren't the only ones to be upwardly mobile in the eighties. The Tandy TRS-80 Model 100 was quick to boot up and ran on batteries for a week.

You may think that notebook computers are a relatively recent item, yet back in 1983, if you'd wanted something on which you could word process, which also had a modem and a terminal and fitted into your briefcase, you could have found what you wanted.

The Tandy TRS-80 Model 100 was made by Kyocera; it also sold under Olivetti and NEC labels and was a cross between a notebook and a Psion 3. In many ways it was as functional as a Psion, having a simple word processor, schedule program, address book and BASIC programming language. A set of AA batteries lasted a week in daily use and it was a wonderful machine for journalists. The keyboard had a great feel to it and despite not being raked it was still possible to rattle out a vast number of words in a very short time. I wish I could remember who borrowed mine.

Filenames were limited to six characters with a two-character extension. There was no need to resort to BASIC's directory function as all files were shown as an initial menu (a precursor to Windows' ability to click on a file icon). The CPU was a Z80A running at 4MHz and the machine was available with 8, 16, 24 or 32Kb of RAM. The display was character-mapped but the inclusion of shapes, such as a space-invader character, made games possible. The eight lines by 40 characters display was a bit limiting, though.

In addition to the four AA batteries, the Model 100 had a rechargeable Ni-Cad which let the computer store everything you'd typed in when it was switched off. There was also a 300-baud cassette interface. The word processor was crude but a plug-in spell-check ROM was available.

In the main, the supplied software was incredibly basic, but the simplicity meant that programs like an alphabetic sort or spell-check could be written in BASIC. The file format was easy enough for simple string manipulation to be workable. This was standard Microsoft BASIC with line numbers and two-letter variable names. Programs were limited only by the amount of RAM in the machine. Sound was limited to a simple beep and graphics to a fairly low resolution. The machine was monochrome. There was no way to connect it to a printer but it had a standard parallel port.

Looking back at the future: Tough and eminently usable, the M100's four AA batteries gave a whole week of service, unlike today's notebooks where a measly three hours is the norm

Telecommunications was so novel at the time that it wasn't possible to get a machine with a UK-approved modem. But it *was* possible to use a US-spec machine. The manual advised you to call the phone company to warn them if you wanted to use a modem. The terminal program was simple enough and allowed you to set word length, stop bits and the like. You could also communicate through a serial port, which was the only way to get files to and from another computer. There were no floppy disk drives, which were 5.25in drives in those days, and all files were small enough.

There is no machine around today which performs the same functions. The most recent attempt at a simple, go-anywhere word processor was the Amstrad NC-200 but there have been several others, including the Z88, the Psion MC and the Liberator, none of which have really been as successful as the M100.

Despite being cased in plastic, the M100 was tough and still sees service with some reporters. The tiny amount of RAM and slow processor didn't prevent the M100 from fulfiling most of the tasks people gave it. I wrote a book on mine and even my 486/100MHz isn't quite as usable: when I board the train in the morning I have to wait for it to boot, whereas the Tandy turned on instantly. I now need to take a power supply with me in case the battery runs out (the M100 ran for a week on one set). One day, the computer of the future will be as easy to use as this.

Simon Rockman

Brainteasers

Quickie

My grandson's age multiplied by his father's age gives a number which is a permutation of the digits from the two original ages. Both ages are in whole numbers of years: how old are they?

This Month's Prize Puzzle

One of my more illustrious ancestors, Field Marshall Maximillian Clessa, was famous for his eccentricity and, in particular, for his numerical obsessions. His military successes during the Trans-Gonadic wars are well documented, and it was during this period that he amassed the largest army in the world, constantly recruiting new men (and women) to make its numbers even greater.

On the occasion of his wife's 40th birthday, he decided to review all his troops and ordered his most senior generals to assemble the entire army on the great plain of Ischium. He initially decided that they should line up in twos (which, incidentally, they would have been able to do exactly) but unfortunately, there wasn't enough room for the formation.

He then tried to line them up exactly in threes, but sadly, he was two men short. Since he could only count in prime numbers, his next attempt was in fives, but again, there were two men short. Likewise with each of the next successive primes, up to and including 19. On each occasion, he was exactly two men short.

He carried on trying with further primes and eventually managed to get the formation he sought.

What's the smallest size his army could have been, and what were the dimensions of the successful formation?

Answers on a postcard or the back of a sealed envelope (no letters and no floppy disks, please) to:

PCW Prize Puzzle November 1996, P.O. Box 99, Harrogate, N. Yorks HG2 0XJ. Your entry should arrive no later than 20th November 1996.

Good luck!

August 1996 Prize Puzzle

Regular readers will be aware that there was a small goof in the August puzzle, where the required row, column and diagonal totals were not printed. We apologise once again for this clanger.

Unfortunately, this means there will be no prizewinner this month — but to make up for it, there will be two next month. Incidentally, many readers who realised that the problem was incorrectly set, nevertheless offered a variety of solutions based on their own hypotheses of what the missing values should have been.

Alas, none were correct. And even if they had been, we could not have accepted them, although they certainly deserve commendations for initiative.

JJ Clessa

Computations

Hold on, please

Phones may not be the low-impact angels they seem. Okay, they don't plug into the electrical socket and the tone is generated by a tiny charge on the line, but running the big system behind the scenes is another matter. BT draws 3,163 gigawatt-hours of electricity a year. About 85 percent of Britain's electricity is of the global-warming kind. So, the telephone suddenly looks less innocent. The BT electricity bill, based on a domestic 8p/Kilowatt-hour, would be £250m.

Well oiled

The microchip has been seen as a big energy-saver and microcomputers in networks have been automating business and industry for ten years. But during that time, despite warnings of the greenhouse effect, production of global-warming petrol from our small number of oil wells increased by a quarter, from the equivalent of 222 supertankers a year (1984), to 275 in 1994 (supertanker;100K tonnes). To show how far a supertanker of oil goes: petrol made from the 22-mile queue of road-tankers' worth of oil spilled off the Welsh coast by the Sea Empress, would have driven the UK car fleet over eight miles.

STATELLITE

The Chinese are buying energy-guzzling colour TVs at the rate of one per second.
■ Source: Euromonitor

Mobile madness

The tide of investment in communications has become a flood. BT has demonstrated a prototype of Dr Spock's wristwatch, the size of a postage stamp, which can run a world video conference from a layby in Penge. I remember calling California from a Vodaphone cellnet mobile the size and weight of a car battery, in 1986. We now have the shirt-pocket edition and more mobile subscribers than there were telephone subscribers when we took on Nazi-occupied Europe.

If it moves, tax it

No licence is required to own a computer. This must be the first new technology never to be dutied by government. Neither is there a tax on computing, other than VAT. Yet motor vehicles have always been licensed and are subject to a luxury tax. When global warming first threatened, this tax heritage offered a way of stemming car use via increases and/or graduated taxation.Yet the opposite happened. Between 1987 and 1991, the government forced global warming by cutting taxation on motor vehicles by 12 percent.

The calculation is: vehicle excise revenue in 1986/7: £2.6m. The revenue due in 1990/1, pegged to the 30 percent increase in RPI (if the number of vehicles had stayed the same), would have been £3.3m. Yet only £2.9m was actually collected — on a greater number of vehicles.

■ Source: Inland Revenue Statistics 1995/Retail Prices 1914 1990 CSO.

Rowland Morgan

Win an Oki printer

The **OkiPage 4w** is the perfect solution for a small office if you want laser quality but without having to sacrifice valuable space to the printer. As a Windows Printing System LED printer, the 4w gives superb quality black-and-white output, with 600dpi-class resolution thanks to Oki's MicroRes technology. It is also pretty quick off the mark, with an output rate of four pages per minute for text, while it produces monochrome graphics in half the time taken by an inkjet.

We have five of these great little printers to give away. For a chance to win one, just answer this simple question:

● At what class resolution does the OkiPage 4w print?

a) 300 dpi
b) 200 dpi
c) 600 dpi

Win a PaperPort Vx

In the world of document scanners, the **PaperPort Vx** is the undeniable leader of the pack. It won the document scanners section of our recent scanner group test, and is easy to use, petite and perfectly formed. You can scan in greyscale up to 400dpi, and drag and drop documents straight in to over 100 packages, doing the OCR on the way where appropriate. It also links to your fax and your printer, so you can use the latter as a copier.

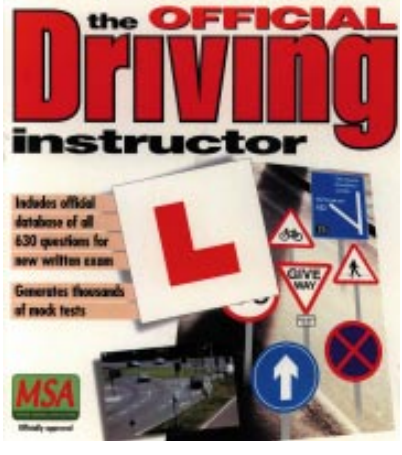
● We have three of these little beauties to give away. For a chance to win one, just tell us the PaperPort Vx's maximum scanning resolution. Is it:

a) 100 dpi
b) 200 dpi
c) 400 dpi

Win a CD

Europress is giving away two of its titles this month. **Language Labs** is taken from the much-admired Rosetta Stone series and is aimed at beginners — see the demo on this month's cover CD. We have four copies of each of the languages: French, German, Spanish and English. In addition, we have ten copies of **Official Driving Instructor** to give away. This is aimed at anyone who has to sit the dreaded written-paper part of the new driving test, and even includes videos to help you improve your driving skills.

● For a chance to win one of these CDs,



tell us when the new written driving test was introduced. Was it:

a) July 1996
b) August 1996
d) June 1996

Rules of entry

This competition is open to readers of *Personal Computer World*, except for employees, and their families, of VNU Business Publications, Oki, Visioneer and Europress. Entries must arrive by 15th November 1996. The Editor of *PCW* is the sole judge of the competition and his decision is final. No cash alternative is available in lieu of prizes.

How to enter

Just write your answers on a postcard or the back of a sealed envelope, along with your name, address and daytime telephone number, and send to: PCW November Competition, CMS Limited, P.O. Box 11312, London WC2H 0DJ.

Note: If you do not wish to receive promotional material from companies other than VNU Business Publications, please specify this on your competition entry.

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ChipChat

True Tales of Technical Support

At one university, the computer centre had been having trouble with a new type of terminal. Apparently, professors loved to pile papers on top of the equipment, which in turn prevented ventilation and caused overheating to the point that the solder on one of the chips melted and the chip fell out.

The technicians were used to this but one day, when one of them took the back off a terminal expecting to find a loose chip, he found a large hole burned in the circuit board. He talked to the professor about it.

Tech: Did you pile papers on the machine?

Prof: Yes.

Tech: Didn't you notice it was starting to smoke?

Prof: You mean it's not supposed to do that?

Tech: No, it's not.

Prof: Well, there wasn't a computer centre bulletin on the subject!

The next day, the following bulletin appeared: "Notice: If your computer catches fire, please turn it off and notify computer services."

■ *Our thanks to Steve Oualline.*

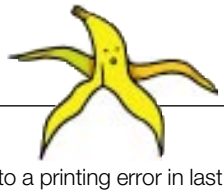
A spiritual thing

Windows users seeking a higher level of spirituality can now, remarkably, access it through their PCs.

Evolve Inc, of Duluth, USA, together with Mindscape Development, makers of those well-known products for Goal Attainment, Sales Maximisation and Golf Performance, have produced inVision for Spiritual Growth.

They claim that "Once loaded on your Windows PC, your inner mind is massaged with positive spiritual messages, affirmations and questions (that are hard-coded into the software, in addition to messages you create) as you work in other software programs. Over time, the software creates desired changes in your mindset like increased self-awareness, access to inner wisdom, a deepened sense of inner peace and a heightened enjoyment of daily life."

However, dark rumours of a hidden "Buy Microsoft Office 97" tie-in message are being circulated. Unnamed industry sources vigorously deny any Microsoft link, based on the fact that everyone knows Microsoft hasn't made an enlightening, stress-free product for years.



● Due to a printing error in last month's multimedia notebooks group test, the Mitac SO24 star ratings appeared incorrectly. They should have read Software Bundle: 1 star, Build Quality: 1.5 stars, Warranty: 1 star, and Overall Value: 2.5 stars. We are sorry for any confusion caused by the error.

● Unfortunately, the information in our news item "Disaster Aid" (*Newsprint*, *PCW* August '96) was incorrect. OnTrack Data Recovery has not published a book on how to recover data from crashed storage systems. OnTrack has produced a pamphlet called "Data Protection Guide" which provides tips on how to protect and secure your computer data. If *PCW* readers are interested, email jhance@ontrack.com. We apologise to OnTrack and our readers for any confusion caused.

Caption Competition

KOBAL COLLECTION

"It's a new 33.6kbps modem. What did you think it was?"

Think you can do better? Email pjfisher@vnu.co.uk or write in to the usual address with your own captions on a postcard marked "Caption Compo" before 18th November. We'll print the funniest entries and the winner will get a £20 book token.